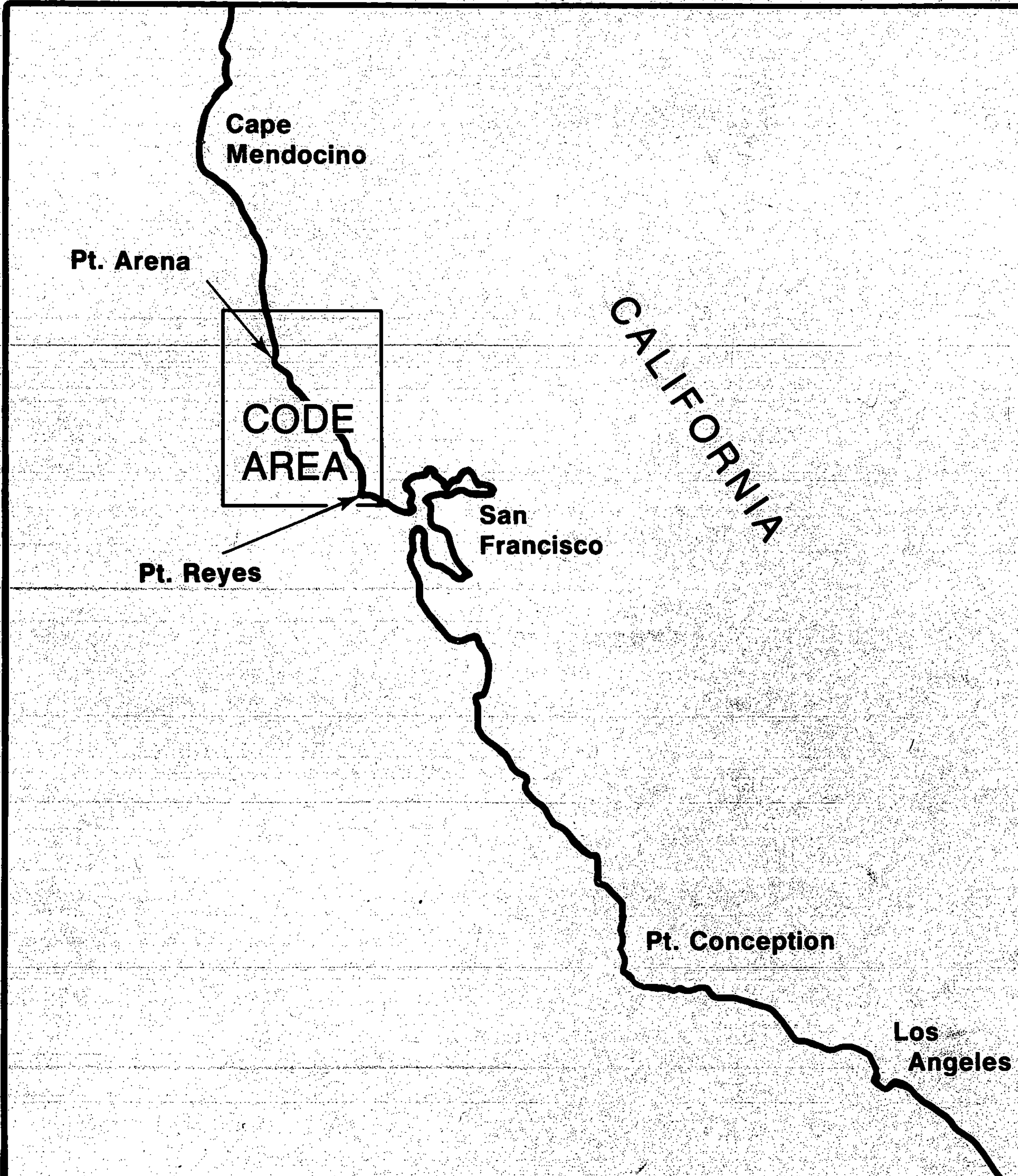

WHOI Technical Report 85-35

COASTAL OCEAN DYNAMICS EXPERIMENT

CODE

1980 1984

NCAR · NOAA · OSU · SIO · UNH · USGS · WHOI

CODE-2: Moored Array and Large-Scale Data Report

CODE Technical Report No. 38

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November 1985
Technical Report
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Approved for Distribution:

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ABSTRACT

The Coastal Ocean Dynamics Experiment (CODE) was undertaken to identify and study the important dynamical processes which govern the wind-driven motion of coastal water over the continental shelf. The initial effort in this multi-year, multi-institutional research program was to obtain high-quality data sets of all the relevant physical variables needed to construct accurate kinematic and dynamic descriptions of the response of shelf water to strong wind forcing in the 2 to 10 day band. A series of two small-scale, densely-instrumented field experiments of approximately four months duration (called CODE-1 and CODE-2) were designed to explore and to determine the kinematics and momentum and heat balances of the local wind-driven flow over a region of the northern California shelf which is characterized by both relatively simple bottom topography and large wind stress events in both winter and summer. A more lightly instrumented, long-term, large-scale component was designed to help separate the local wind-driven response in the region of the small-scale experiments from motions generated either offshore by the California Current system or in some distant region along the coast, and also to help determine the seasonal cycles of the atmospheric forcing, water structure, and coastal currents over the northern California shelf.

The first small-scale experiment (CODE-1) was conducted between April and August, 1981 as a pilot study in which primary emphasis was placed on characterizing the wind-driven "signal" and the "noise" from which this signal must be extracted. In particular, CODE-1 was designed to identify the key features of the circulation and its variability over the northern California shelf and to determine the important time and length scales of the wind-driven response. The second small-scale experiment (CODE-2) was conducted between April and August, 1982 and was designed to sample more carefully the mesoscale horizontal variability observed in CODE-1. This report presents a basic description of the moored array data and some other Eulerian data collected during CODE-2. A brief description of the CODE-2 field program is presented first, followed by a description of the common data analysis procedures used to produce the various data sets presented here. Then basic descriptions of the following data sets are presented: (a) the coastal and moored meteorological measurements, (b) the moored current measurements, (c) array plots of the surface wind stress and near-surface current measurements, (d) the moored temperature and conductivity observations, (e) the bottom pressure measurements, and (f) the wind and adjusted coastal sea level observations obtained as part of the CODE-2 large-scale component.

INTRODUCTION TO THE CODE-2
MOORED ARRAY AND LARGE-SCALE DATA REPORT

By

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a strong annual cycle which consists of generally southward (upwelling - favorable) winds in the spring and summer and strong variable winds in the winter. The middle and outer shelf in this region has a mud/silty-sand bottom and is generally characterized by an absence of large-scale bedforms (Cacchione et al., 1983), hence relatively well-behaved near-bottom flow was expected and found in CODE-1 (Grant et al., 1984). Finally, the proximity of adequate port and laboratory facilities in San Francisco, Bodega Bay, and Newport (Oregon), combined with the use of a dedicated research vessel, the R/V Wecoma, simplified the logistics in studying this region.

The CODE-1 results showed that the current field was highly coherent in the vertical, but exhibited larger than expected horizontal mesoscale variability over the shelf and suggested that the flow over both shelf and slope may be strongly influenced by offshore eddy features, distant and local wind forcing, and local topographic features like Pt. Arena and Pt. Reyes. As a result, the second small-scale experiment, CODE-2, was designed with reduced vertical but increased horizontal sampling to study the mesoscale variability in all parameters. The major observational elements in CODE-2 were: (a) moored arrays instrumented to measure wind velocity, air temperature, atmospheric pressure, relative humidity, solar radiation, current velocity, water temperature, conductivity, bottom pressure, and to estimate bottom stress, (b) shipboard observations of water temperature, conductivity, and current velocity as a function of depth and (c) aircraft observations of wind velocity, wind stress, sea surface temperature, surface drifter motion, and atmospheric structure. Satellite-derived sea surface temperature data and coastal zone color scanner (CZCS) data were collected, and auxiliary measurements of wind, atmospheric pressure, and sea level at appropriate coastal stations and environmental buoys were also obtained. The individual principal investigators responsible for these different observational components are listed in Table 1.

The moored current meter program was designed to examine the vertical and horizontal structure of the current and temperature fields over the shelf and upper slope. Accordingly, an array of instrumented moor-

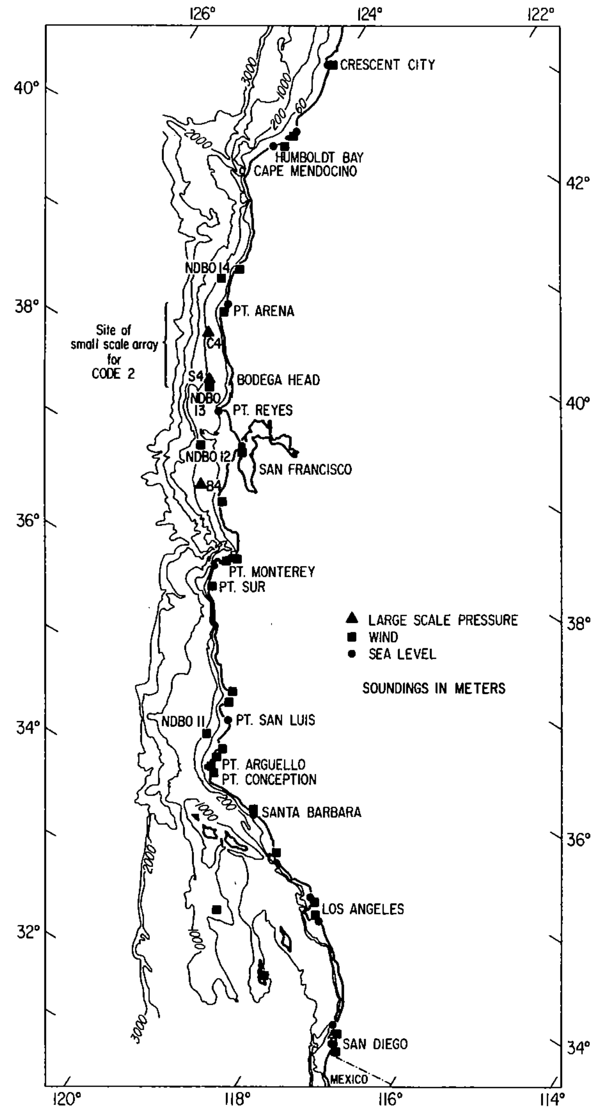

Figure 1. The region of the CODE-2 small-scale experiment shown in relationship to the rest of the California coast and adjacent continental shelf. The locations of the large-scale pressure array and the California wind and sea level stations are also included.

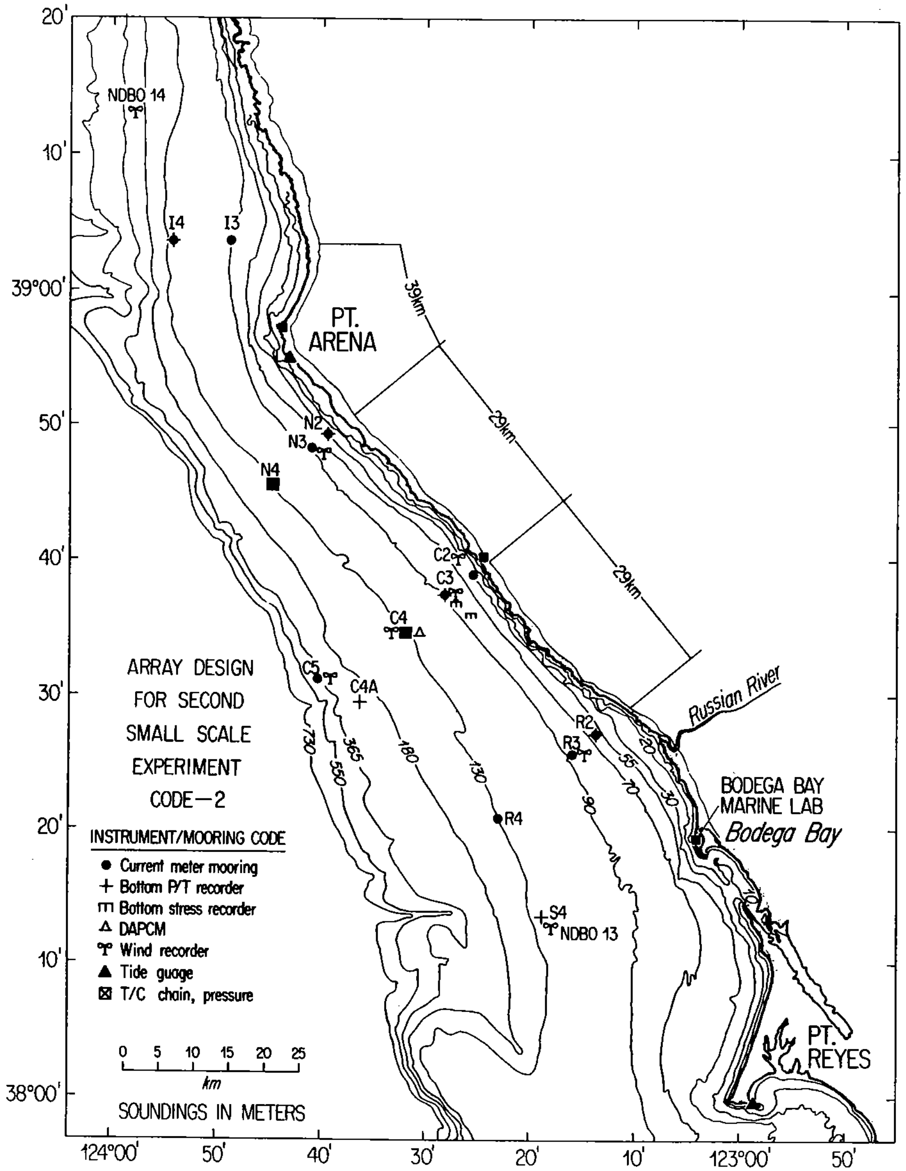

Figure 2. The CODE-2 moored array design, showing the locations of the principal CODE-2 measurement sites along Irish (I), north (N), central (C), and Ross (R) cross-shelf transects. The instrumentation and mooring code indicates the type of measurement made at each site.

ings was deployed consisting of three main cross-shelf subarrays and a lightly instrumented cross-shelf array just north of Pt. Arena. A plan view of the CODE-2 moored array design is shown in Figure 2, and a schematic side view given in Figure 3. The three main cross-shelf subarrays were labeled the N (North), C (Central), and R (Ross) lines, and consisted of moorings deployed at the 60 m, 90 m and 130 m isobaths which characterize the inner, mid- and outer shelf. The individual mooring sites are denoted by a letter indicating the cross-shelf subarray followed by an integer indicating the water depth, with 2, 3 and 4 referring to 60, 90, and 130 m, respectively. Current meters were generally deployed at common depths throughout the array although additional instruments were deployed at C2 and C3 to resolve the near-surface flow. A current meter mooring (C5) was also deployed at 400 m depth over the upper slope as part of the central cross-shelf subarray located off Stewart's Point near Sea Ranch. The I cross-shelf subarray deployed north of Point Arena near Irish Gulch consisted of moorings supporting three current meters

TABLE 1: CODE Principal Investigators

Investigator (Affiliation)	Research Area
J. Allen (OSU)	Large-scale atmospheric pressure, winds, and coastal sea-level observations.
A. Huyer (OSU)	Hydrography.
R. Davis/C. Winant (SIO)	Small-scale current and temperature measurements, Lagrangian flow measurements, shipboard current measurements, and satellite data.
W. Brown/J. Irish (UNH)	Bottom pressure measurements, density chain and upward Doppler profiler measurements.
W. Grant/A. Williams III (WHOI) D. Cacchione/D. Drake (USGS)	Bottom stress measurements, swell and wind-wave climate, bottom topography and geology.
R. Beardsley (WHOI)	Long-term current and temperature observations, small-scale buoy wind, current and temperature measurements, overall program coordination.
C. Friehe (NCAR/U.C. Irvine)	Aircraft measurements of wind, wind stress, and planetary boundary layer structure.

deployed at 90 m (I3) and 130 M (I4). As part of the moored current meter array, meteorological buoys were deployed at C2, C3, C4, and C5 along the central line and at N3 and R3 along the 90 m isobath.

Coastal sea level measurements were obtained for Arena Cove (near Point Arena) and Pt. Reyes, and bottom pressure/temperature instruments were deployed at S4, R2, C2, C3, C4, C4A, N2 and I4 (see Figure 2) to (a) measure the along- and cross-shelf structure of the pressure field and (b) allow estimation of the along- and cross-shelf pressure gradients in the region of the CODE-2 small-scale array. An additional bottom pressure/temperature instrument was deployed along the 130 m isobath at B4, (see Figure 1) as part of the large-scale component. The bottom pressure observations were augmented by synthetic subsurface pressure data computed from coastal sea level and atmospheric pressure observations at coastal stations along the West Coast of North America (see Figure 1).

In general, several different types of moorings were deployed at each site in the CODE-2 moored array. Near-surface current meters were supported by surface buoys which

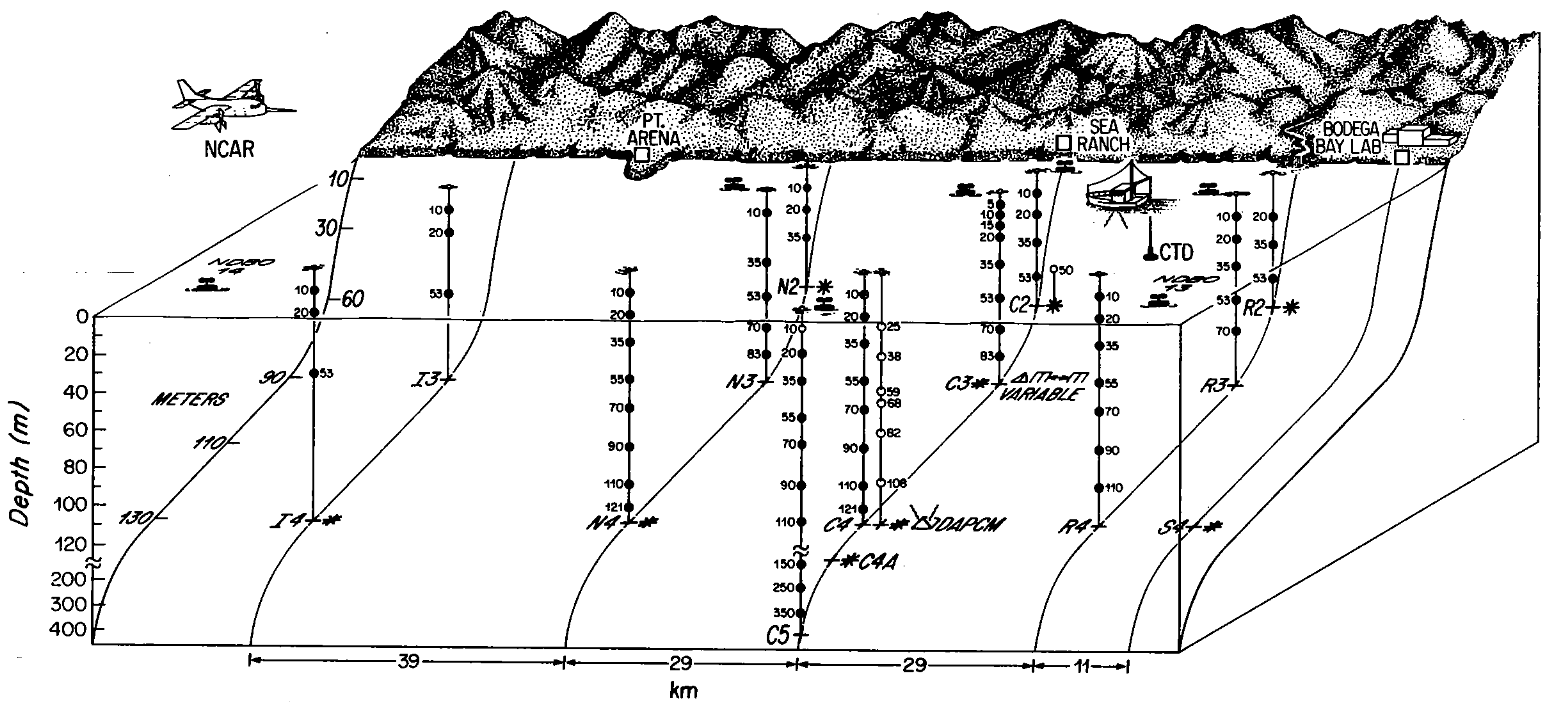

Figure 3. A three-dimensional schematic of the CODE-2 moored array. Current meter locations are identified by (•), meteorological buoys (), the temperature/conductivity chain (o), the bottom stress instrumentation (), bottom pressure/temperature recorders (*), and coastal meteorological stations (□).

were either instrumented meteorological buoys or uninstrumented guard buoys. Deeper current meters and the thermistor/conductivity chains were deployed on subsurface moorings which were set between clusters of surface buoys to help protect the subsurface mooring from fishing and shipping activity. The bottom instrumentation was generally set as close to the cluster of surface buoys as possible. A detailed plan view of the individual moorings deployed at each site is given in Figure 4. The individual moorings at a site are distinguished by the letter following the site identification. The following scheme was generally used, however, some exceptions were made. Uninstrumented surface buoys supporting subsurface instrumentation were labelled A, instrumented surface buoys, some of which supported subsurface instrumentation, were labelled B, uninstrumented guard buoys were labelled either G or H, and subsurface current meter and thermistor/conductivity chain moorings were labelled S. The relative positions have been determined from a combination of radar ranges and bearings, Loran-C position data, and optical bearings taken during the deployment and recovery cruises and are considered to have an estimated uncertainty of ± 50 m. Coordinates for each mooring are given in Table 2, and relative positions are shown in Figure 4; the coordinates are considered to be less accurate than the positions shown in the figure due to errors in the conversion of Loran-C data into latitude and longitude. A summary of all instrumentation deployed on the different moorings at each site is also listed in Table 2.

The CODE-2 moored array was deployed in stages during a series of cruises conducted aboard the research vessel Wecoma, by SIO, UNH, and WHOI between March 3 and April 2. The array was also recovered in stages during a series of cruises aboard the Wecoma during the period July 27 to August 24. Consequently, the instruments at different stations had different deployment periods which are shown in Figure 5 along with the times during which other CODE-2 measurements were made. Each instrument did not necessarily record good data for all of its variables for the entire period shown. The dates of good data return are included in the separate chapters of this report along

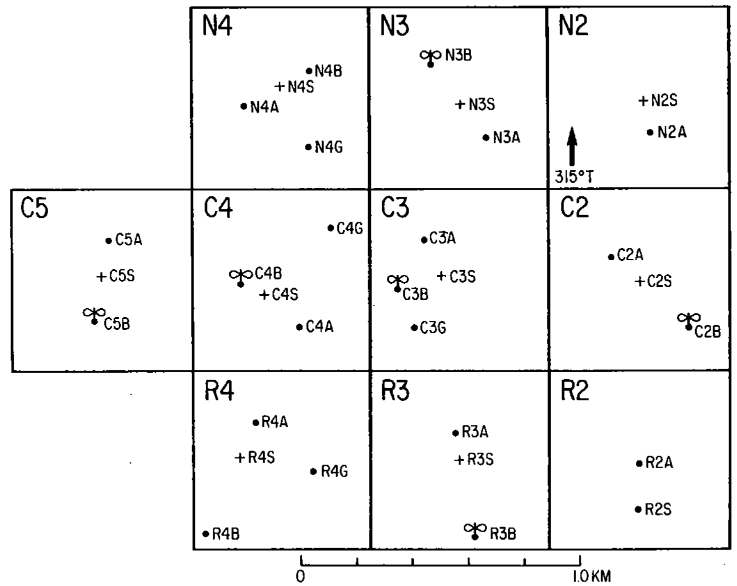

Figure 4. The relative positions of individual moorings at each station are shown in the outlined boxes. The orientation and horizontal scale are common to all boxes.

with more detailed descriptions of the various moored array data sets.

While the different data sets presented in this report have been processed and edited at different laboratories using the standard procedures and routines used by each group, some common conventions have been used to standardize the basic data sets. For all vector and scalar variables that were sampled at intervals less than one hour, time series of one hour vector or scalar averages, centered on the even hour, have been constructed (e.g., the value assigned to 1200 is an average of data collected between 1130 and 1230). All plots and statistics presented in this report are based on these one-hour averaged time series unless otherwise indicated. Greenwich Mean Time (GMT) is used as the common time reference. Where necessary, time series have been adjusted from Pacific Standard Time (PST) to Greenwich Mean Time by the addition of eight hours (1200 PST corresponds to 2000 GMT).

The vector current and wind data collected in the CODE-2 region have been rotated into a coordinate system aligned with the mean coastline orientation and shelf

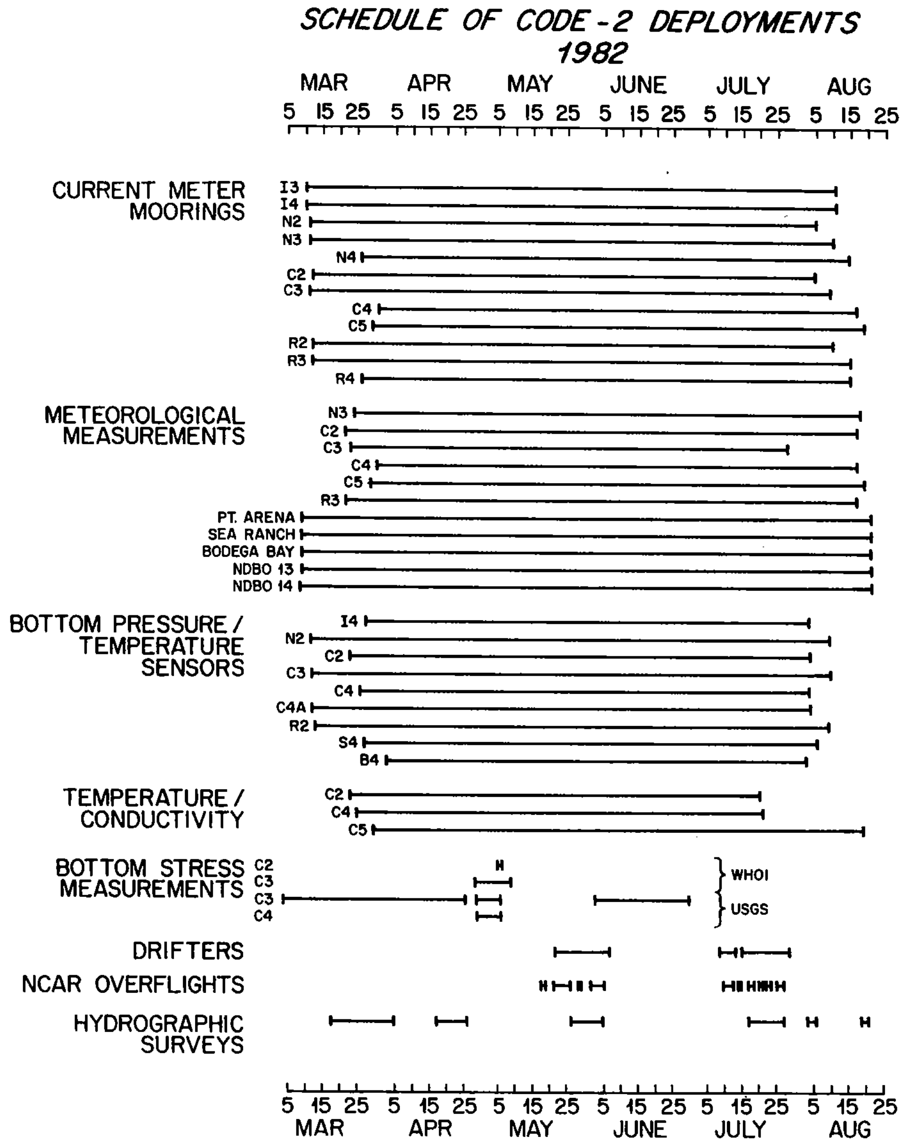

Figure 5. Deployment and recovery schedule for CODE-2 instrumentation.

topography near the central line. The new coordinate system is rotated 43° counter-clockwise with respect to true north. Thus the along-shelf component is positive towards 317°T and the cross-shelf component is positive towards 47°T. Vector wind data collected outside of the CODE-1 region as part of the large-scale component have been rotated differently into a local principal axes coordinate system.

A number of different low-pass filters have been used by various CODE investigators to analyze the data from this experiment. Some of these filtered time-series are presented in this report, in its predecessor, the CODE-1 report (Rosenfeld, 1983), and in other CODE publications. We present here a compilation of these filters presented in a manner so as to facilitate comparison between them and to enable the reader to see exactly what effect each filter has on the time-series to which it is applied.

Five filters are included, two from WHOI and one each from SIO, UNH and OSU. All are non-recursive, symmetric filters. The total number of weights applied to hourly time-series varies from 67 to 181. For each filter, a set of weights normalized to sum to one was created (shown in Figure 6 for positive time only) and padded with zeros to get a total of 1000 points for comparison purposes. Changing the series length changes the resolution in the frequency domain of the transfer function, but does not affect its shape. These series were then fast-Fourier transformed with a standard IMSL routine. The resulting amplitude response functions (also known as gain or transfer functions) are shown in Figure 7. In the lower part of each plot where the full frequency range of .001 cph to .5 cph is shown, a logarithmic scale is used on the vertical axis with an arbitrary lower cut-off of 10^{-4}. The upper part of each plot is a blow-up of the low frequency portion of the spectrum with a linear scale on the vertical axis. The locations of the diurnal and semi-diurnal frequencies on these plots are marked for easy reference. The power response function of each filter is just equal to the square of the amplitude response function. Table 3 summarizes the characteristics of each of these filters, including the number of weights employed and their generating functions, the half power and half amplitude points, and the power and amplitude at diurnal and semi-diurnal frequencies.

The rest of this report is organized in the following way. The coastal and moored meteorological and moored current observations made in the CODE-2 small-scale array shown in Figure 2 are presented in Chapters 2 and 3, respectively. Chapter 4 contains low-pass filtered array plots of the surface wind stress and currents at 10 m. All moored temperature and conductivity observations and all bottom pressure observations made in both the CODE-2 small-scale (Figure 2) and the CODE-2 large-scale array (Figure 1) are described in Chapters 5 and 6, respectively. The final chapter presents the wind and adjusted coastal sea level observations obtained as part of the CODE-2 large-scale component.

Acknowledgments

The very successful execution of the CODE-2 field program was made possible through the efforts of a great many people, and the CODE principal investigators would like to take this opportunity to express their deep appreciation for the excellent scientific, engineering, and technical support given throughout the program. The skill and cooperation of the research vessel Wecoma (OSU), contributed significantly to the success of the seagoing operations, and the officers and crew of the U.S. Coast Guard Base at Yerba Buena Island in San Francisco Bay helped make that facility ideal for staging the field program. The Coastal Ocean Dynamics Experiment has been supported by grants to the individual institutions from the Ocean Sciences Division of the National Science Foundation.

This technical report has been prepared at WHOI under the editorship of R. Limeburner. The graphics have been prepared by J. Zwinakis and L. Raymond. The text and tables have been typed by A.-M. Michael. R. Beardsley provided editorial assistance. The CODE principal investigators would like to express their appreciation to this group. The final preparation and production of this report has been supported by the Ocean Sciences Division of the National Science Foundation.

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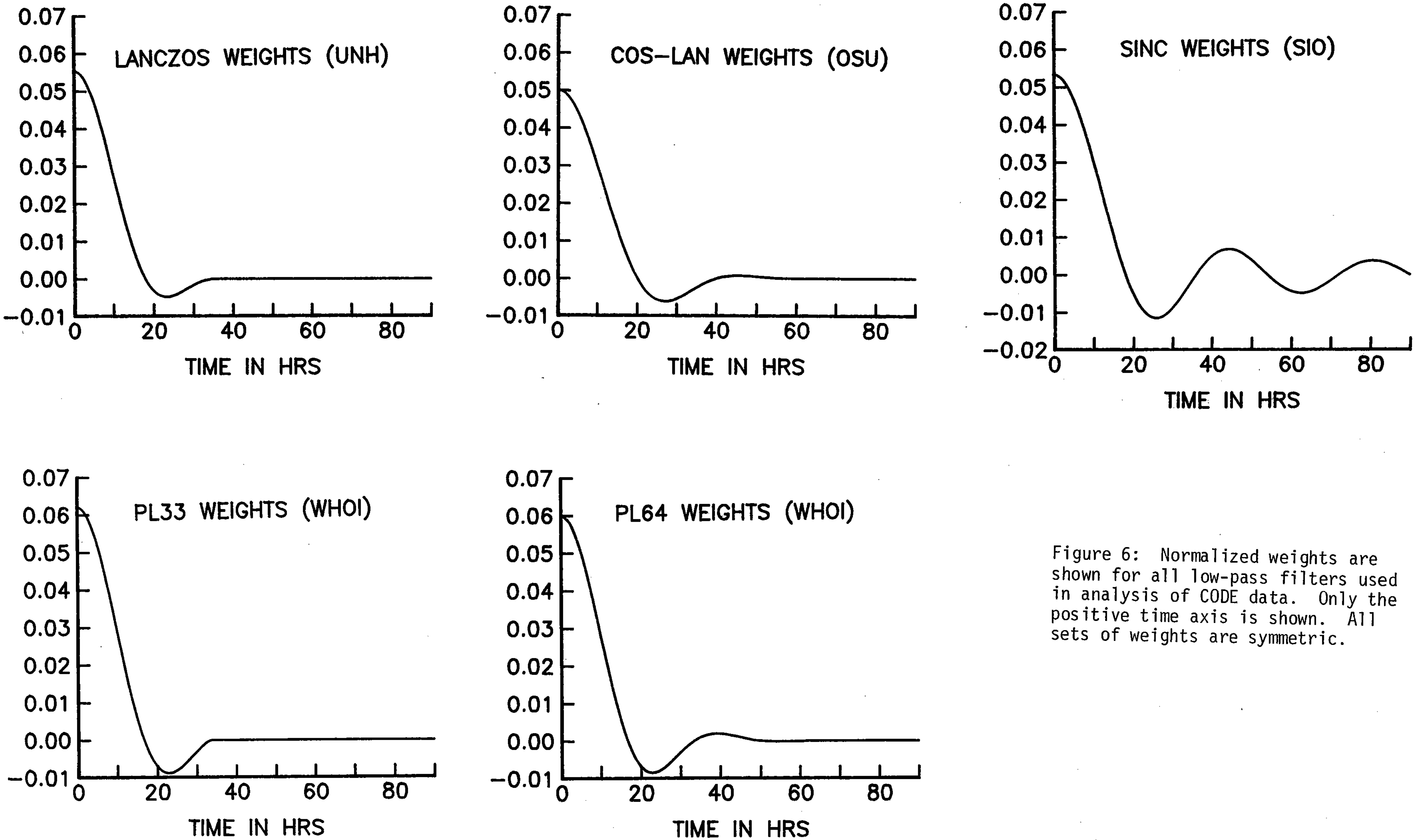
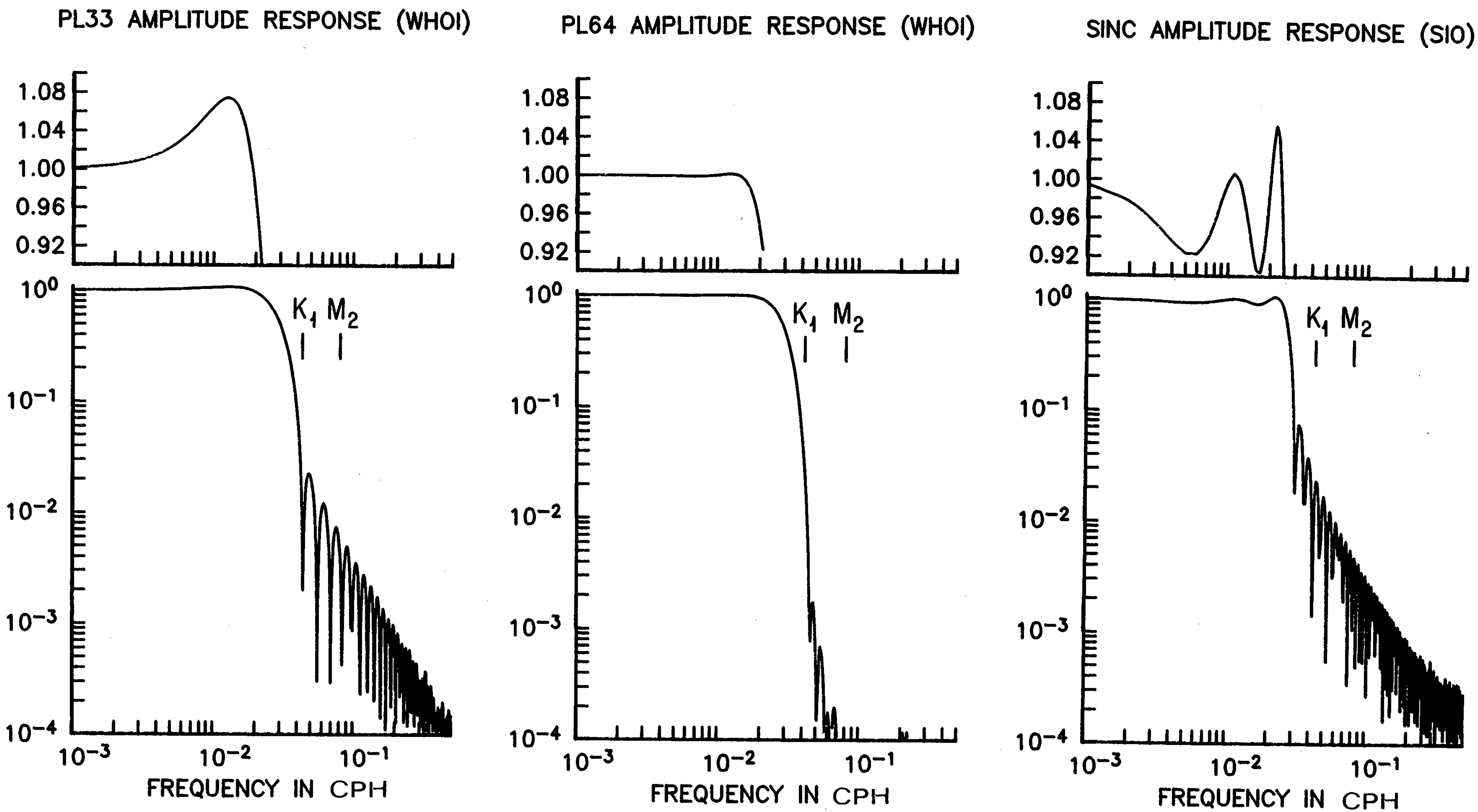


Figure 6: Normalized weights are shown for all low-pass filters used in analysis of CODE data. Only the positive time axis is shown. All sets of weights are symmetric.


PL33 AMPLITUDE RESPONSE (WHOI)
PL64 AMPLITUDE RESPONSE (WHOI)
SINC AMPLITUDE RESPONSE (SIO)
1.08
1.04
1.00
0.96
0.92
10^0
10^{-1}
10^{-2}
10^{-3}
10^{-4}
K_1 M_2
10^{-3} 10^{-2} 10^{-1}
FREQUENCY IN CPH

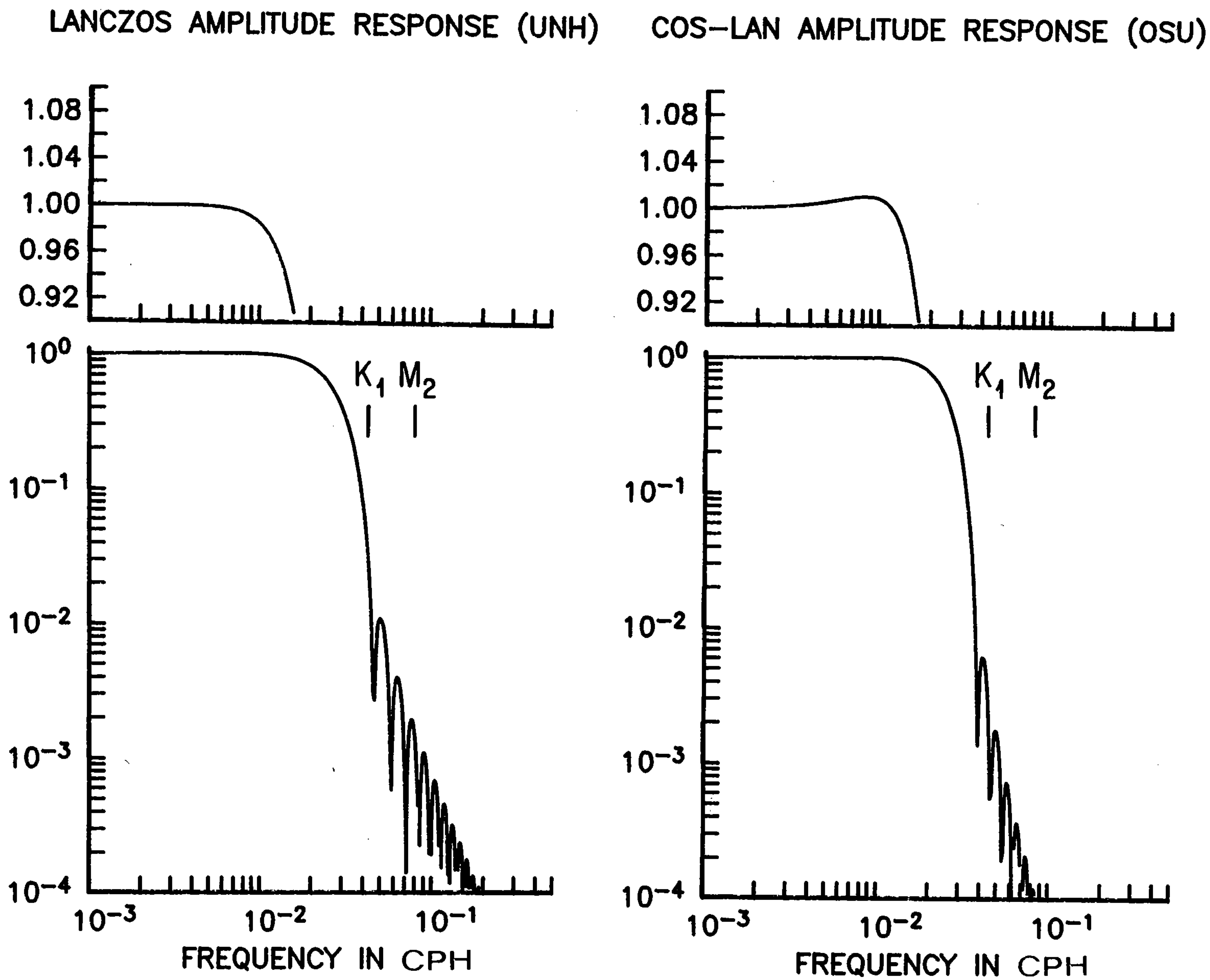


Figure 7: The amplitude response versus frequency in cycles/hr is shown for each filter considered. The lower panels show the full frequency range available from 1000 hourly data points. The upper panels show a blow-up of the low-frequency response using a linear vertical scale. The K_1 and M_2 tidal frequencies are marked for reference.

TABLE 2: Moored Instrumentation Deployed in CODE-2

Stn	Mooring	Water Depth (m)	Latitude N	Longitude W	Date Set	Date Recovered	Instru-ment	Sensor Depth (m)	Instru-ment Source	Data Return
I3	I3A	90	39°03.0'	123°48.7'	03/10/82	08/11/82	VMCM/T	10	SIO	Complete
I3	I3A	90	39°03.0'	123°48.7'	03/10/82	08/11/82	VMCM/T	20	SIO	Complete
I3	I3A	90	39°03.0'	123°48.7'	03/10/82	08/11/82	VMCM/T	53	SIO	Complete
I4	I4A	131	39°03.0'	123°55.2'	03/10/82	08/11/82	VMCM/T	10	SIO	Complete
I4	I4A	131	39°03.0'	123°55.2'	03/10/82	08/11/82	VMCM/T	20	SIO	Complete
I4	I4A	131	39°03.0'	123°55.2'	03/10/82	08/11/82	VMCM/T	53	SIO	Complete
I4	Bottom	133	39°03.0'	123°55.1'	03/10/82	08/11/82	P/T	132	UNH	Complete
N2	N2A	60	38°49.5'	123°40.1'	03/10/82	08/10/82	VMCM/T	10	SIO	Complete
N2	N2A	60	38°49.5'	123°40.1'	03/10/82	08/10/82	VMCM/T	20	SIO	Complete
N2	N2S	64	38°49.5'	123°40.3'	03/11/82	08/10/82	VMCM/T	35	SIO	Complete
N2	N2S	64	38°49.5'	123°40.3'	03/11/82	08/10/82	VMCM/T	53	SIO	No Data
N2	Bottom	64	38°45.7'	123°45.6'	03/16/82	08/08/82	P/T	63	SIO	Complete
N3	N3B	93	38°48.1'	123°41.8'	03/24/82	08/18/82	VAWR	-3.5	WHOI	Complete
N3	N3B	93	38°48.1'	123°41.8'	03/24/82	08/18/82	I	-3.5	WHOI	Complete
N3	N3B	93	38°48.1'	123°41.8'	03/24/82	08/18/82	AT	-3.5	WHOI	Complete
N3	N3B	93	38°48.1'	123°41.8'	03/24/82	08/18/82	T	1	WHOI	Complete
N3	N3A	90	38°48.1'	123°41.7'	03/10/82	08/10/82	VMCM/T	10	SIO	Complete
N3	N3A	90	38°48.1'	123°41.7'	03/10/82	08/10/82	VMCM/T	20	SIO	Complete
N3	N3S	91	38°48.1'	123°41.8'	03/11/82	08/10/82	VMCM/T	35	SIO	Complete
N3	N3S	91	38°48.1'	123°41.8'	03/11/82	08/10/82	VMCM/T	53	SIO	Complete
N3	N3S	91	38°48.1'	123°41.8'	03/11/82	08/10/82	VMCM/T	70	SIO	Complete
N3	N3S	91	38°48.1'	123°41.8'	03/11/82	08/10/82	VMCM/T	83	SIO	Complete
N4	N4B	129	38°45.8'	123°45.6'	03/24/82	08/20/82	VACM/T	10	WHOI	Complete
N4	N4B	129	38°45.8'	123°45.6'	03/24/82	08/20/82	VMCM/T	20	WHOI	Complete
N4	N4S	130	38°45.7'	123°45.6'	03/24/82	08/20/82	VMCM/T	35	WHOI	Complete
N4	N4S	130	38°45.7'	123°45.6'	03/24/82	08/20/82	VMCM/T	55	WHOI	Complete
N4	N4S	130	38°45.7'	123°45.6'	03/24/82	08/20/82	VMCM/T	70	WHOI	Complete

Mooring designations and instrument abbreviations are defined at the end of this table.

TABLE 2: Moored Instrumentation Deployed in CODE-2 (Continued)

Stn	Mooring	Water Depth (m)	Latitude N	Longitude W	Date Set	Date Recovered	Instru-ment	Sensor Depth (m)	Instru-ment Source	Data Return
N4	N4S	130	38°45.7'	123°45.6'	03/24/82	08/20/82	VMCM/T	90	WHOI	Complete
N4	N4S	130	38°45.7'	123°45.6'	03/24/82	08/20/82	VMCM/T	110	WHOI	Complete
N4	N4S	130	38°45.7'	123°45.6'	03/24/82	08/20/82	VACM/T	121	WHOI	Complete
C2	C2B	59	38°38.2'	123°25.2'	03/23/82	08/17/82	VAWR	-3.5	WHOI	Complete
C2	C2B	59	38°38.2'	123°25.2'	03/23/82	08/17/82	I	-3.5	WHOI	Complete
C2	C2B	59	38°38.2'	123°25.2'	03/23/82	08/17/82	AT	-3.5	WHOI	Complete
C2	C2B	59	38°38.2'	123°25.2'	03/23/82	08/17/82	T	1	WHOI	Complete
C2	C2A	60	38°38.2'	123°25.3'	03/11/82	08/13/82	VMCM/T	10	SIO	Complete
C2	C2A	60	38°38.2'	123°25.3'	03/11/82	08/13/82	VMCM/T	20	SIO	Complete
C2	C2S	60	38°38.2'	123°25.3'	03/11/82	08/13/82	VMCM/T	35	SIO	Complete
C2	C2S	60	38°38.2'	123°25.3'	03/11/82	08/13/82	VMCM/T	53	SIO	Complete
C2	Picket	61	38°38.2'	123°25.3'	03/23/82	08/04/82	T,C	50	UNH	Record Ends 07/20/82
C2	Bottom	61	38°38.2'	123°25.3'	03/23/82	08/04/82	P/T	60	UNH	Complete
C3	C3B	93	38°36.4'	123°27.7'	03/23/82	08/17/82	VAWR	-3.5	WHOI	Seven-Day Gap: 3/30-04/06
C3	C3B	93	38°36.4'	123°27.7'	03/23/82	08/17/82	H	-3.5	WHOI	Seven-Day Gap: 3/30-04/06
C3	C3B	93	38°36.4'	123°27.7'	03/23/82	08/17/82	I	-3.5	WHOI	Seven-Day Gap: 3/30-04/06
C3	C3B	93	38°36.4'	123°27.7'	03/23/82	08/17/82	AT	-3.5	WHOI	Seven-Day Gap: 3/30-04/06
C3	C3B	93	38°36.4'	123°27.7'	03/23/82	08/17/82	T	1	WHOI	Seven-Day Gap: 3/30-04/06
C3	C3B	93	38°36.4'	123°27.7'	03/23/82	08/17/82	VAWR(I)	-3.5	WHOI	Nine-Day Gap: 4/06-4/15;
C3	C3B	93	38°36.4'	123°27.7'	03/23/82	08/17/82	AT	-3.5	WHOI	Record Ends : 7/02
C3	C3B	93	38°36.4'	123°27.7'	03/23/82	08/17/82	AP	-3.5	WHOI	No Data
C3	C3B	93	38°36.4'	123°27.7'	03/23/82	08/17/82	VMCM/T	5	WHOI	Complete
C3	C3B	93	38°36.4'	123°27.7'	03/23/82	08/17/82	VACM/T,C	10	WHOI	Conductivity Sensor Failed
C3	C3B	93	38°36.4'	123°27.7'	03/23/82	08/17/82	VMCM/T	15	WHOI	Complete
C3	C3B	93	38°36.4'	123°27.7'	03/23/82	08/17/82	VMCM/T	27	WHOI	No Data
C3	C3A	90	38°36.4'	123°27.7'	03/11/82	08/09/82	VMCM/T	10	SIO	Complete
C3	C3A	90	38°36.4'	123°27.7'	03/11/82	08/09/82	VMCM/T	20	SIO	Complete
C3	C3S	90	38°36.4'	123°27.7'	03/11/82	08/09/82	VMCM/T	35	SIO	Complete

TABLE 2: Moored Instrumentation Deployed in CODE-2 (Continued)

Stn	Mooring	Water Depth (m)	Latitude N	Longitude W	Date Set	Date Recovered	Instru-ment	Sensor Depth (m)	Instru-ment Source	Data Return
C3	C3S	90	38°36.4'	123°27.7'	03/11/82	08/09/82	VMCM/T	53	SIO	Complete
C3	C3S	90	38°36.4'	123°27.7'	03/11/82	08/09/82	VMCM/T	70	SIO	Complete
C3	C3S	90	38°36.4'	123°27.7'	03/11/82	08/09/82	VMCM/T	83	SIO	Complete
C3	Bottom	91	38°36.4'	123°27.7'	03/12/82	08/09/82	P/T	90	SIO	Complete
C3U	Geoprobe	93	38°36.2'	123°27.7'	06/01/82	07/29/82	P,TR,N,CA 4EM,2T	92	USGS	Short Record
C4	C4B	130	38°33.4'	123°31.7'	03/31/82	08/17/82	VAWR	-3.5	WHOI	Complete
C4	C4B	130	38°33.4'	123°31.7'	03/31/82	08/17/82	I	-3.5	WHOI	No Data
C4	C4B	130	38°33.4'	123°31.7'	03/31/82	08/17/82	AT	-3.5	WHOI	Complete
C4	C4B	130	38°33.4'	123°31.7'	03/31/82	08/17/82	T	1.0	WHOI	Complete
C4	C4B	130	38°33.3'	123°31.6'	03/31/82	08/17/82	VACM/T	10	WHOI	Complete
C4	C4B	130	38°33.3'	123°31.6'	03/31/82	08/17/82	VMCM/T	20	WHOI	Complete
C4	C4S	130	38°33.3'	123°31.6'	03/31/82	08/17/82	VMCM/T	35	WHOI	Complete
C4	C4S	130	38°33.3'	123°31.6'	03/31/82	08/17/82	VMCM/T	55	WHOI	Complete
C4	C4S	130	38°33.3'	123°31.6'	03/31/82	08/17/82	VMCM/T	70	WHOI	Complete
C4	C4S	130	38°33.3'	123°31.6'	03/31/82	08/17/82	VMCM/T	90	WHOI	Complete
C4	C4S	130	38°33.3'	123°31.6'	03/31/82	08/17/82	VMCM/T	110	WHOI	u,v, Short
C4	C4S	130	38°33.3'	123°31.6'	03/31/82	08/17/82	VACM/T	121	WHOI	Complete
C4	Bottom	132	38°33.5'	123°31.5'	03/25/82	07/21/82	T,C	24	UNH	Complete
C4	Bottom	132	38°33.5'	123°31.5'	03/25/82	07/21/82	T,C	37	UNH	Complete
C4	Bottom	132	38°33.5'	123°31.5'	03/25/82	07/21/82	T,C	59	UNH	Complete
C4	Bottom	132	38°33.5'	123°31.5'	03/25/82	07/21/82	T,C	67	UNH	Complete
C4	Bottom	132	38°33.5'	123°31.5'	03/25/82	07/21/82	T,C	82	UNH	C Short
C4	Bottom	132	38°33.5'	123°31.5'	03/25/82	07/21/82	T,C	108	UNH	Complete
C4	Bottom	132	38°33.5'	123°31.5'	03/25/82	07/20/82	P/T	131	UNH	Short
C4	Bottom	132	38°33.5'	123°31.5'	04/02/82	04/29/82	DAPCM	133	UNH	Complete
C4	Bottom	132	38°33.5'	123°31.5'	05/07/82	08/03/82	DAPCM	133	UNH	Complete
C4A	Bottom	203	38°30.0'	123°36.3'	03/23/82	08/03/82	P/T	202	UNH	Complete
C5	C5B	400	38°30.8'	123°40.3'	03/29/82	08/19/82	VAWR	-3.5	WHOI	Complete
C5	C5B	400	38°30.8'	123°40.3'	03/29/82	08/19/82	I	-3.5	WHOI	No Data

TABLE 2: Moored Instrumentation Deployed in CODE-2 (Continued)

Stn	Mooring	Water Depth (m)	Latitude N	Longitude W	Date Set	Date Recovered	Instru-ment	Sensor Depth (m)	Instru-ment Source	Data Return
C5	C5B	400	38°30.8'	123°40.3'	03/29/82	08/19/82	AT	-3.5	WHOI	Complete
C5	C5B	400	38°30.8'	123°40.3'	03/29/82	08/19/82	AP	-3.5	WHOI	Complete
C5	C5B	400	38°30.8'	123°40.3'	03/29/82	08/19/82	H	-3.5	WHOI	Complete
C5	C5B	400	38°30.8'	123°40.3'	03/29/82	08/19/82	T	1	WHOI	Complete
C5	C5B	400	38°30.8'	123°40.3'	03/29/82	08/19/82	VACM/T,C	10	WHOI	No u,v
C5	C5B	400	38°30.8'	123°40.3'	03/29/82	08/19/82	VMCM/T	20	WHOI	Complete
C5	C5B	400	38°30.8'	123°40.3'	03/29/82	08/19/82	VMCM/T	35	WHOI	Complete
C5	C5B	400	38°30.8'	123°40.3'	03/29/82	08/19/82	VMCM/T	55	WHOI	Complete
C5	C5S	400	38°30.8'	123°40.3'	03/29/82	08/20/82	VACM/T,P	70	WHOI	Complete
C5	C5S	400	38°30.8'	123°40.3'	03/29/82	08/20/82	VMCM/T	90	WHOI	Complete
C5	C5S	400	38°30.8'	123°40.3'	03/29/82	08/20/82	VACM/T,P	110	WHOI	Pressure Drifts
C5	C5S	400	38°30.8'	123°40.3'	03/29/82	08/20/82	VACM/T	150	WHOI	Complete
C5	C5S	400	38°30.8'	123°40.3'	03/29/82	08/20/82	VACM/T	250	WHOI	Complete
C5	C5S	400	38°30.8'	123°40.3'	03/29/82	08/20/82	VACM/T	350	WHOI	Complete
R2	R2A	60	38°27.2'	123°14.0'	03/12/82	08/10/82	VMCM/T	10	SIO	No u,v
R2	R2A	60	38°27.2'	123°14.0'	03/12/82	08/10/82	VMCM/T	20	SIO	Complete
R2	R2S	60	38°27.1'	123°13.9'	03/12/82	08/09/82	VMCM/T	35	SIO	Complete
R2	R2S	60	38°27.1'	123°13.9'	03/12/82	08/09/82	VMCM/T	53	SIO	Complete
R2	Bottom	60	38°27.1'	123°13.9'	03/12/82	08/09/82	P/T	59	SIO	Complete
R3	R3B	90	38°25.4'	123°16.4'	03/12/82	08/14/82	VAWR	-3.5	WHOI	Complete
R3	R3B	90	38°25.4'	123°16.4'	03/12/82	08/14/82	I	-3.5	WHOI	Record Ends 8/12
R3	R3B	90	38°25.4'	123°16.4'	03/12/82	08/14/82	AT	-3.5	WHOI	Complete
R3	R3B	90	38°25.4'	123°16.4'	03/12/82	08/14/82	T	1	WHOI	Complete
R3	R3A	90	38°25.4'	123°16.4'	03/12/82	08/14/82	VMCM/T	10	SIO	Complete
R3	R3A	90	38°25.4'	123°16.4'	03/12/82	08/14/82	VMCM/T	20	SIO	Complete
R3	R3S	90	38°25.4'	123°16.4'	03/12/82	08/14/82	VMCM/T	35	SIO	Complete
R3	R3S	90	38°25.4'	123°16.4'	03/12/82	08/14/82	VMCM/T	53	SIO	Complete
R3	R3S	90	38°25.4'	123°16.4'	03/12/82	08/14/82	VMCM/T	70	SIO	Complete
R3	R3S	90	38°25.4'	123°16.4'	03/12/82	08/14/82	VMCM/T	83	SIO	No u,v
R4	R4B	130	38°20.9'	123°23.0'	04/01/82	08/18/82	VACM/T	10	WHOI	Complete
R4	R4B	130	38°20.9'	123°23.0'	04/01/82	08/18/82	VMCM/T	20	WHOI	Complete

TABLE 2: Moored Instrumentation Deployed in CODE-2 (Continued)

Stn	Mooring	Water Depth (m)	Latitude N	Longitude W	Date Set	Date Recovered	Instru-ment	Sensor Depth (m)	Instru-ment Source	Data Return
R4	R4S	130	38°20.8'	123°23.0'	03/26/82	08/15/82	VMCM/T	35	WHOI	Complete
R4	R4S	130	38°20.8'	123°23.0'	03/26/82	08/15/82	VMCM/T	55	WHOI	Complete
R4	R4S	130	38°20.8'	123°23.0'	03/26/82	08/15/82	VMCM/T	70	WHOI	Complete
R4	R4S	130	38°20.8'	123°23.0'	03/26/82	08/15/82	VMCM/T	90	WHOI	Complete
R4	R4S	130	38°20.8'	123°23.0'	03/26/82	08/15/82	VMCM/T	110	WHOI	Complete
R4	R4S	130	38°20.8'	123°23.0'	03/26/82	08/15/82	VACM	121	WHOI	No Data
S4	Bottom	132	38°14.2'	123°19.7'	03/26/82	08/05/82	P/T	131	UNH	Complete
Point Arena:	Coastal		38°57.0'	123°25.5'	03/01/82	08/31/82	WR	-10	USCG	Complete
Sea Ranch:	Coastal		38°41.0'	123°25.5'	03/01/82	08/17/82	WR	-10	SIO	Complete
Bodega Bay:	Coastal		38°19.0'	123°04.0'	03/01/82	09/25/82	WR	-10	SIO	Complete

Mooring Designations:

A - Uninstrumented surface buoy supporting subsurface instrumentation.
B - Surface toroid buoy with meteorological sensors, may have current meters below.
Bottom - Instrumented bottom mooring
S - Instrumented subsurface mooring supporting current meters or a thermistor conductivity chain.

Abbreviations:

AP: Atmospheric Pressure
AT: Air Temperature
C: Conductivity
CA: Camera
DAPCM: Doppler Acoustic Profiling Current Meter
EM: Electromagnetic Current Meter
H: Relative Humidity
I: Insolation
N: Nephelometer
P: Pressure
T: Water Temperature
TR: Transmissometer
VAWR: Vector Averaging Wind Recorder
VACM: Vector Averaging Current Meter
VMCM: Vector Measuring Current Meter
WR: Wind Recorder

Table 3: Characteristics of Low-Pass Filters Used to Analyze CODE Data are Presented.

Institute	WHOI	WHOI	SIO	OSU	UNH
Filter Name[i]	PL33	PL64	SINC	COSINE-LANCZOS[iii]	LANCZOS
Generating Function For Weights	$\left[\frac{2\sin(.06\pi t)}{.0009\,\pi^3 t^3}\right.$	$\left.-\frac{\sin(.03\pi t)+\sin(.09\pi t)}{.0009\,\pi^3 t^3}\right]$[ii]	$\frac{\sin(\pi t/18)}{\pi t/18}$	$.5[1+\cos(\pi t/61)]\frac{\sin(2\pi t/40)}{2\pi t/40}$	$\frac{\sin(.056\pi t)}{.056\pi t}$
Number of Symmetric Weights in Filter	67	129	181	121	73
Half Power Point	38h	38h	38h	46h	44h
Half Amplitude Point	33h	33h	36h	40h	36h
Power at 24.39h	.00281	.00128	.00026	.00004	.00398
Amplitude at 24.39h	.05299	.03582	.01620	.00618	.06305
Power at 12.5h	.00003	.00000	.00000	.00000	.00000
Amplitude at 12.5h	.00544	.00002	.00194	.00007	.00168

i. The names used are those by which each institution refers to its filter.

ii. PL33 was developed by C. Flagg and R. Beardsley (Flagg, Vermersch and Beardsley, 1976) by doing an FFT on a number of points generated from a function which is piecewise parabolic and linear (hence the name PL) in the frequency domain. The algorithm shown here, used for both PL33 and PL64, is an analytic transform of that same function.

iii. Some attributes of this filter are described in Pittock, Gilbert, Huyer and Smith, 1982.

CODE-2:

COASTAL AND MOORED

METEOROLOGICAL OBSERVATIONS

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A. INTRODUCTION

The Coastal Ocean Dynamics Experiment (CODE) is a multi-institutional field observation and data analysis program designed to identify and evaluate the dominant physical processes which govern wind-driven motion of coastal water over the continental shelf. This report presents coastal and moored buoy meteorological observations obtained during the CODE-2 field experiment conducted off northern California during March through August, 1982. We will describe first the design and motivation of the meteorological sampling array, then describe the various instrumentation systems used and, finally, present the basic meteorological data sets in primarily graphical form.

B. METEOROLOGICAL ARRAY DESIGN AND INSTRUMENTATION

B.1 Array Design

Serial meteorological data was collected during CODE-2 over the spatial array shown in Figure 1. Coastal wind measurements were made at Sea Ranch and the Bodega Bay Marine Laboratory using portable self-recording anemometer systems installed and maintained by SIO personnel. In addition,

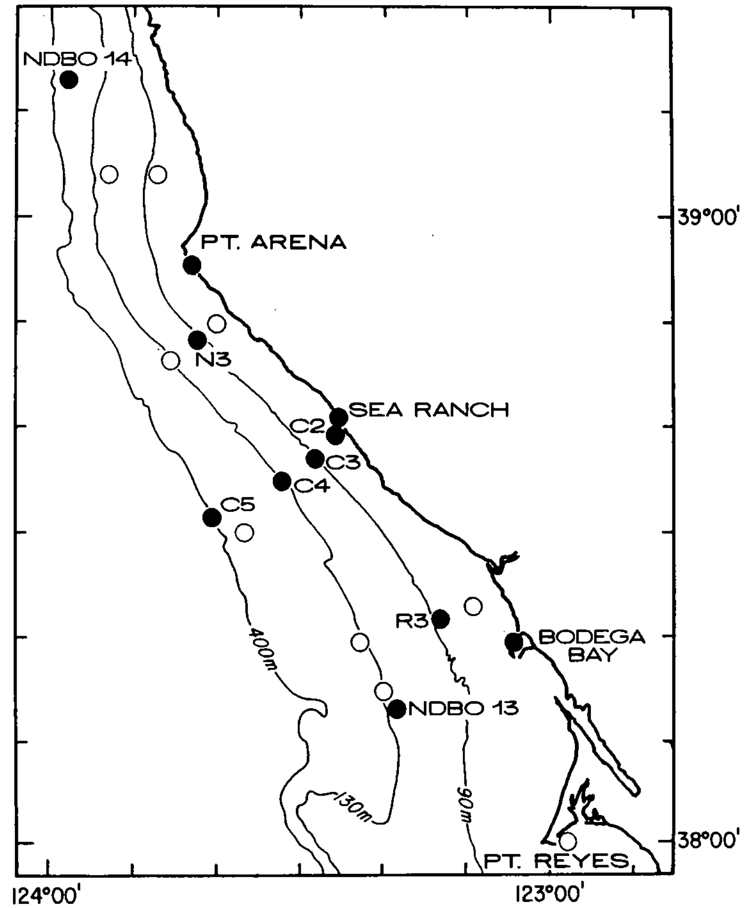

Figure 1. Stations where wind measurements were obtained during CODE-2 are shown as darkened circles.

wind measurements made by the USCG at the Pt. Arena Light have been obtained by OSU personnel for inclusion here. Self-recording instrumented buoys were deployed by WHOI at N3, C2, C3, C4, C5 and R3 to obtain surface meteorological data. The initial objectives of this moored array were: (a) to obtain, at representative positions within the CODE-2 area, accurate seasonal measurements of the horizontal wind velocity, air and sea surface temperature, barometric pressure, relative humidity, and insolation which could be used to construct time series estimates of the surface wind, wind stress, and heat flux, and to examine the cross-shelf and along-shelf structure as well as the coherence of these fields; (b) to obtain engineering information on two different wind sensor designs deployed on the WHOI C3 buoy. The cross-shelf structure information was to be provided by the subarray formed by the coastal station at Sea Ranch, and the C2, C3, C4, and C5 meteorological buoys which spanned the shelf along the CODE-2 central line out to the upper slope. Alongshelf structure information was to be obtained from the subarrays formed by N3, C3 and R3 located along the

90 m isobath and the Pt. Arena, Sea Ranch and Bodega Bay coastal stations. Additional information on the spatial structure of the wind and wind stress fields over the coastal region during CODE-2 was to be provided by the NCAR aircraft program.

Prior to the CODE-2 field experiment, the NOAA Data Buoy Office deployed two telemetering meteorological buoys EB46013 and EB46014 off northern California near Bodega Bay and Crescent City, respectively (Figure 1). Data from both buoys has been obtained from NDBO by OSU and is included here as part of our basic data set.

B.2 Instrumentation

We will give next a brief description of the instrumentation used to collect meteorological data in CODE-2 (see Table 1 for a list of measurement locations, times, and variables measured).

Wind velocity was measured at Sea Ranch using a Meteorology Research Inc. (MRI) 3-cup anemometer and vane set (model 1022) mounted 10 m above the ground at the northern end of a deserted barn located roughly 100 m inshore of the coastal cliffs. The analog signals were separately averaged for 4 minutes, then recorded on tape. A second MRI wind sensor set was mounted on a tower approximately 10 m above the ground at the Bodega Bay Marine Laboratory and the data recorded in a similar way. These two coastal meteorological stations were established and maintained by SIO personnel, who also carried out the preliminary data processing before sending the edited data to WHOI.

The WHOI toroid buoys were instrumented to measure horizontal wind velocity at 3.5 m height with vector-averaging wind recorders (VAWRs) equipped with a utility wind vane and 3-cup anemometer set developed by Professor G. C. Gill of the University of Michigan. This anemometer has a threshold of < 0.7 m/s and a distance constant of about 3.7 m, while the vane has a threshold of < 0.7 m/s and a damping ratio of 0.37. The Gill utility sensor sets were purchased from the R. M. Young Company (models 6301 and 6101) and modified to supply appropriate digital signals to the vector computer in the VAWR. Wind speed accuracy has been estimated to be better than ± 0.2 m/s or 5% of reading including buoy motions effects. In addition, at C3, a seventh VAWR was deployed with an "integral" sensor set for comparison with the Gill sensor set (see Dean and Beardsley, 1985) The integral VAWR uses the Gill-type cup set mounted atop a three-legged support which acts as a protective cage; the wind vane mounts inside the cage directly below the cups. The vane is magnetically coupled to a VACM vane follower, a seven-bit digital encoder located inside the cylindrical electronics housing. This design provides an integral assembly requiring no special alignment of vane and compass when the VAWR is placed on the buoy tower. This wind vane has a shorter (smaller) distance constant than that of the Gill vane, but the response is retarded by the eddy current damping characteristic of the vane follower.

The meteorological buoys measured air temperature with thermistors mounted in a naturally-vented radiation shield manufactured at WHOI and similar in design to the Thaller shield [model II, Gill (1979)]. The meteorological buoys were also equipped with Epply Company (model 8-48) black and white type pyranometers to measure incident solar radiation or insolation. Water temperature was measured on all buoys with a precision thermistor mounted at 1 m depth.

Table 1: The Coastal and Moored Meteorological Data Obtained in CODE-1.

Name	Location (°N/°W)	Start/Stop (GMT)	Sensor Height (m)	Variables
COASTAL				
Point Arena Light	38°57.3'/123°44.4'	820301/820831	6.1*	Wind Speed, Direction
Sea Ranch (Black's Point)	38°41.0'/123°25.5'	820301/820831	10.0*	Wind Speed, Direction
Bodega Bay Marine Lab	38°19.0'/123°04.0'	820301/820831	10.0*	Wind Speed, Direction
WHOI BUOY				
N3	38°48.1'/123°41.8'	820408/820817	3.5	Wind Speed, Direction, Air Temperature, Water Temperature, Insolation
C2	38°38.2'/123°28.1'	820323/820817	3.5	Wind Speed, Direction, Air Temperature, Water Temperature, Insolation
C3	38°36.4'/123°27.7'	820324/820731	3.5	Wind Speed, Direction, Air Temperature, Water Temperature Insolation, Barometric Pressure, Humidity
C4	38°33.3'/123°40.5'	820401/820717	3.5	Wind Speed, Direction, Air Temperature, Water Temperature, Insolation
C5	38°30.8'/123°40.3'	820324/820819	3.5	Wind Speed, Direction, Air Temperature, Water Temperature, Insolation, Barometric Pressure
R3	38°25.2'/123°16.2'	820323/820817	3.5	Wind Speed, Direction, Air Temperature, Water Temperature, Insolation
NDBO BUOY				
13	38°13.0'/123°18.0'	820301/820831	10.0	Wind Speed, Direction, Air Temperature, Water Temperature (1 m), Atmospheric Pressure
14	39°13.0'/123°58.0'	820301/820831	10.0	Wind Speed, Direction, Air Temperature, Water Temperature (1 m), Atmospheric Pressure

*Approximate height above ground.

The two NDBO meteorological buoys were equipped with the standard NDBO general service buoy payload (GSBP) sensors and telemetry system. The sensors and system specifications are described by Hamilton (1980) and given here in Table 2.

B.3 Field Calibration of VAWR/Gill Systems

Several short intercomparison experiments were conducted with the six WHOI meteorological buoys just prior to their deployment at sea and immediately following recovery. In the first intercomparison experiment, the six buoys were placed in a line along the bulkhead at the Yerba Buena Coast Guard Base, and data from the period 0700 GMT to 2030 GMT March 21 were compared to check on sensor and system performance. The second intercomparison experiment was designed to compare the buoy measured direction with a known absolute direction. Each buoy was separately positioned above a reference point in the Yerba Buena Coast Guard Base parking lot where the local magnetic field was known to be uniform. The buoy vane was then pointed toward a known reference orientation and fixed for at least thirty minutes. The vane orientation was internally recorded and later compared with the true orientation. The results of these two intercomparison tests are summarized next.

(1) Wind Speed, S: The wind speed was light (less than 2.0 m/sec and variable) during the dock test period so that a significant intercomparison of wind speed was not possible, however, the wind speeds recorded at C2 and C4 seemed low by a factor of about 0.5. In order to investigate if this possible error occurred in stronger winds at sea during the CODE-2 deployment period, a comparison was then made between the buoy wind speeds observed at C2, C3, C4 and C5 and the wind speed measured by the NCAR Queen Air research aircraft during its low level flights. An intercomparison of buoy and low level aircraft wind measurements had been made in CODE-1 by Friehe et al. (1984) who found generally good agreement between aircraft winds and buoy winds adjusted to the aircraft height using diabatic flux-profile relations and bulk aerodynamic formulas to estimate the surface fluxes and stability. In CODE-2, many of the Queen Air flights passed close to at least one of the central line mooring sites so that although not designed for this use, we were able to find 34 pairs of simultaneous buoy and aircraft wind speed measurements. To compare these sets of measurements, we followed Friehe et al. (1984) and adjusted the buoy winds to aircraft height using the formula

$$U_2(Z_2) = U_1(Z_1) + \frac{U_*}{K}\left[\ln\frac{Z_2}{Z_1} + 4.7\,\frac{Z_2-Z_1}{L}\right],$$

where U_1 is the buoy wind speed measured at Z_1, U_2 is the wind speed predicted at the aircraft height of Z_2, and $U_* = \sqrt{\tau_0/\rho_{air}}$ where u_* and τ_0 are the friction velocity and windstress, respectively, and L is the Monin-Obukhov length. The initial results of this comparison between aircraft and adjusted buoy winds showed the wind speeds at C2 and C4 to be low by a factor of 0.5. One possible explanation is that the magnetic diode which normally generates two pulses per anemometer cup revolution only generated one pulse per revolution due to a slight misalignment of the two magnets located on the shaft of the anemometer cup. Figure 2 shows the compar-

Table 2: Meteorological Sensor and System Characteristics of Instrumentation as used in CODE-2

	Parameter	Sensor	Manufacturer (Model)	Range	Sensor Accuracy	Sampling/Recording Scheme	System Accuracy
COASTAL	Wind Speed Wind Direction	3-Cup Anemometer Vane	Meteorological Research, Inc. (1022)	0-60 m/s 0-360°	±0.5 m/s or 1% ± 5°	4 min average of each variable recorded every 4 min	± 0.7 m/s or 1% ± 5°
	Atmos. Pressure	Digiquartz	Paroscientific	0-45 psia	± 0.1 mb		± 0.4 mb
WHOI BUOY	Wind Speed Wind Direction	3-Cup Anemometer Vane Magnetic Compass	RM Young (6301)* " " (6101)* EG&G (VACM)	0-54 m/s 0-360°	< 5% ± 3.1°	Vector-averaged recorded every 7.5 minutes.	< 5% ± 3.1°
	Air Temperature	Thermistor	Yellow Springs Instruments (44034)	0-30°	± 0.1°C	1-7/8 min average of each variable recorded every 7.5 minutes.	± 0.3°C
	Water Temperature	Thermistor	Thermometrics, Inc.	0-30°	± 0.005°C		± 0.01°C
	Insolation	Pyranometer	Epply Co. (8-48)	0-2 cal/cm^2 per minute	5%	7.5 minute average recorded every 7.5 minutes.	< 10%
	Barometric Pressure	Digiquartz	Paroscientific	0-1240 mb	0.2 mb	2.5 sec average recorded every 7.5 minutes.	0.3 mb at < 60 m/s
	Relative Humidity	Cellulose Crystallite Strip	Hy-Cal	0-100%	± 6% Res.	1-7/8 min average recorded every 7.5 minutes.	± 6%

*These parts were modified at WHOI.

Table 2: Meteorological Sensor and System Characteristics of Instrumentation as used in CODE-2 (Continued)

	Parameter	Sensor	Manufacturer (Model)	Range	Sensor Accuracy	Sampling/Recording Scheme	System Accuracy
NDBO BUOY	Wind Speed Wind Direction	Propeller Vane and Flux-gate Compass	NDBO General Service Buoy Payload	0-80 m/s 0-360°		8.5 min average of each variable sampled at 1 Hz. Averaged value transmitted every hour.	± 1 m/s or 10% ± 10°
	Air Temperature Water Temperature	Thermistor Thermistor		-15° to 50°C -15° to 50°C		One sample per hour transmitted every hour.	± 1°C ± 1°C
	Atmospheric Pressure	Variable Capacitance		900-1100 mb		8.5 min average of 4 sec samples transmitted once every hour.	± 1 mb

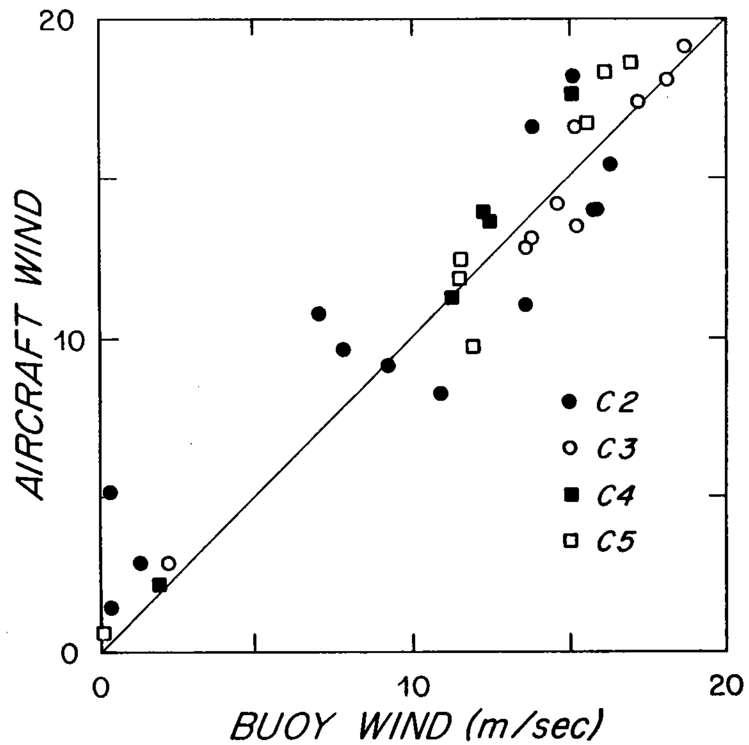

Figure 2. Comparison of 33 m aircraft wind speeds after C2 and C4 3.5 m wind speeds increased by factor of 2.0. Solid line indicates one-to-one relationship.

ison of aircraft and adjusted buoy winds after the wind speeds at buoy C2 and C4 were increased by a factor of 2.0. The agreement is generally good with most of the data points falling within the ± 1.8 m/sec standard deviation between aircraft and adjusted buoy winds found in CODE-1. On the basis of this comparison, we have multiplied the original one-hour vector-averaged wind speeds at C2 and C4 by the factor 2 to form the basic wind time series presented here and used in all subsequent analysis.

(2) Wind Direction: The angular differences between the buoy recorded directions and the absolute directions determined during the dock tests are summarized below for both before and after the at-sea deployment.

Buoy	Δθ (April)	Δθ (August)
N3	0.2	Bad Clock
C2	2.8	0.7
C3	14.3	14.7
C3 (Integral)	-1.9	Dead Battery
C4	0.1	-4.1
C5	3.0	10.0
R3	-2.5	No Vane

The angular differences for the different buoys are, in general, small with the exception of an approximately constant 14.5° offset for the standard VAWR on buoy C3. This implies that a consistent 14.5° difference in the wind direction recorded by the C3 standard VAWR was due to an accumulation of angular offsets in the compass, vane follower, and sensor frame orientation. To correct for this error, we have added a constant 14.5° anti-clockwise rotation to the C3 VAWR direction data. This correction is consistent with the pre-deployment direction difference between the standard and integral VAWRs on C3 and an independent comparison of wind direction measurements made at sea between the C3 standard and integral VAWR. The implied possible drift in orientation of the C5 VAWR was not apparent in the wind time series and thus no orientation correction has been made.

(3) Air Temperature, T: Air temperature data was measured with the modified Thaller type shield in CODE-2 and comparison of this data for the 13.5 hr duration of the dock test yields the following differences:

$$C5 = 1.004 * C3 - 0.040 \pm 0.010^\circ C$$
$$C5 = 1.034 * C4 - 0.412 \pm 0.008^\circ C$$
$$C5 = 0.981 * N3 + 0.193 \pm 0.008^\circ C$$
$$C5 = 0.992 * R3 + 0.144 \pm 0.006^\circ C$$

While these differences are generally within the $\pm$ 0.1°C interchangeability specification given by the thermistor manufacturer, larger errors can be caused by diurnal radiation effects. Gill (1979) reports that the insolation error is < 0.5°C for wind speeds above 4 m/s for a modified Thaller shield (model II) made from several types of plastic materials. The WHOI shield was made from aluminum and painted white, and should exhibit similar insolation error characteristics.

(4) Insolation, I: Linear regression between pairs of insolation sensors (expressed in mw/cm^2) gives

$$C4 = 0.990 * C2 - 0.200 \pm 1.227$$
$$C4 = 1.049 * C3 - 5.445 \pm 3.550$$
$$C4 = 1.045 * C5 - 8.316 \pm 3.646$$
$$C4 = 0.958 * R3 - 2.538 \pm 2.346$$

N3 = No Calibration Data

These differences are generally within the manufacturer's calibration of $\pm$ 3%.

(5) Barometric Pressure, BP: A comparison between the C5 VAWR barometric pressure recording and barometric pressure measured aboard the R/V Wecoma at the hydrographic station COC7 located near C5 during CODE-2 gives as the mean difference and standard deviation

$$C5 - BP_W = 0.65 \pm .31 \text{ mb.}$$

The observed barometric pressure varied between 1008 mb and 1020 mb over the eight sets of measurements.

(6) Relative Humidity, H: Comparison of VAWR relative humidity readings with relative humidity values computed using wet and dry bulb thermometers, for the mean differences and standard deviations gives

$$C3 - H_{obs} = -.4\% \pm 4.7\%,$$
$$C5 - H_{obs} = 1.0\% \pm 3.8\%.$$

A total of seven wet and dry bulb temperature pairs were measured over an 18-hour period including the pre-deployment dock test and the observed relative humidity varied from 60 to 80%.

B.4 System Accuracy and Performance

The two SIO coastal stations and six WHOI meterological buoys returned high quality data for most of the CODE-2 deployment period. The Gill utility wind vane and 3-cup anemometer set proved to be a rugged and reliable, yet responsive, pair of sensors. The integral VAWR sensor system also worked well and both the standard Gill and integral VAWRs will be described in detail in Dean and Beardsley (1985).

A summary of the sensor and system characteristics for the different meteorological instrumentation systems is given in Table 2. The information on the SIO instrumentation was provided by C. Winant. J. Dean provided additional information on the VAWR specifications. The direction accuracy listed for the VAWRs is taken from a field study of VACM direction errors by Bryden (1976). The characteristics of the GSBP measurement and telemetry system used in the NDBO buoys are taken from Hamilton (1980). An intercomparison between low-level aircraft wind measurements and surface wind data collected with WHOI VAWRs and the NDBO buoys in CODE-1 is presented in Friehe et al. (1984).

C. DATA PROCESSING

Preliminary processing of the SIO coastal wind and pressure data was performed by C. Winant and S. Lentz at SIO, and a vector-averaged one hour edited version sent to WHOI for further analysis.

Meteorological data recorded on standard magnetic tape (1/8" 4-track cassettes) in the WHOI VAWRs were transcribed onto 9-track computer-compatible tape at WHOI. The data were then converted to scientific units, edited to remove launch and retrieval transients, linearly interpolated across missing or erroneous data cycles, and stored on magnetic tape in Maltais format (Maltais, 1969). A vector-averaged one hour version was then made for each VAWR data set for further analysis. The VAWRs functioned correctly with the exception of the C3 integral system which stopped recording data on July 7, 1982, the C3 VAWR which had a seven-day gap, and the C5 VAWR which had a failure of the solar radiation and relative humidity sensors.

The NDBO buoy meteorological data was obtained from NDBO by J. Allen and G. Halliwell at OSU and then transmitted to WHOI where missing data gaps were edited and a one-hour version prepared for further analysis.

The basic data set presented here thus consists of edited vector-averaged one hour time series for wind and the other measured variables. All wind time series have been rotated into a standard coordinate system, with the X or East axis pointing onshore towards 47°T and the Y or North axis pointing along-shelf towards 317°T. All wind data are presented in this coordinate system unless otherwise stated. Greenwich Mean Time (GMT) is used throughout this report (GMT = PST + 8 hr).

We also present here wind stress computed from the observed wind data. The computational scheme uses the neutral steady state drag coefficient C_{dn} and iterative method given by Large and Pond (1981) where

$$10^3\, C_{dn} = \begin{cases} 1.2 & U_{10} < 11 \text{ m/s}, \\ 0.49 + 0.065\, U_{10} & 11 \text{ m/s} < U_{10} < 25 \text{ m/s}. \end{cases} \qquad (1)$$

Neutral stability is assumed and the 10 m wind U_{10} is found through iteration from the observed wind U_o at the observation height h_o (in meters) using

$$U_{10} = \frac{U_o}{1 + \frac{\sqrt{C_{dn}(U_{10})}}{K} \ln \frac{h_o}{10}} \quad . \qquad (2)$$

The neutral stress is then given by $\tau_{on} = \rho \times C_{dn}(U_{10}) \times (U_{10})^2$ where the air density has been assumed to be constant at 1.22×10^{-3} gm/cm^3.

There are three main sources of error in this bulk aerodynamic approach: (a) experimental uncertainty in C_{dn}, (b) the effect of stratification on the observed wind profile and the assumption of neutral stability, and (c) time changes in the wind field and sea state, causing additional (temporal) changes in C_{dn}. Based on their own and other field measurements, Large and Pond (1981) estimate the experimental uncertainty in C_{dn} to be of order 10 to 20%. Large and Pond (1981) also provide a method to compute the influence of stratification on derived wind stress using the observed wind, air and sea temperatures, relative humidity, and bulk aerodynamic

Table 3: Hourly Averaged Statistics for CODE-2 Meteorological Measurements

	Cross-Shelf Wind (m/s)				Along-Shelf Wind (m/s)				Vector Mean	Direction	Speed (m/s)			
	Mean	SD	Max	Min	Mean	SD	Max	Min	(m/s)	(Rel to 317°T)	Mean	SD	Max	Min
Pt. Arena	-1.99	2.97	7.35	-9.60	-2.96	3.68	7.88	-13.13	3.57	213.91	5.07	3.07	14.07	0.00
Sea Ranch	-0.17	1.68	5.71	-4.67	-2.23	3.61	5.27	-14.85	2.24	184.36	3.66	2.73	15.03	0.04
Bodega Lab	1.62	2.02	10.56	-6.02	-3.30	3.83	6.49	-14.77	3.68	153.85	4.82	2.99	15.75	0.00
N14	-1.03	2.31	10.10	-7.61	-5.95	5.35	8.38	-18.03	6.04	189.82	7.30	4.13	18.39	0.00
N3	-1.89	1.72	4.67	-6.07	-5.78	4.68	7.75	-14.79	6.08	198.11	7.05	3.49	15.19	0.07
C2	0.00	1.63	5.96	-5.89	-4.85	5.69	10.11	-25.46	4.85	180.00	6.30	4.34	25.46	0.04
C3	0.66	1.29	6.20	-2.97	-5.86	5.45	7.79	-15.72	5.90	173.57	7.07	4.02	15.88	0.11
C4	-0.19	1.21	5.83	-3.94	-6.03	4.89	7.33	-13.73	6.03	181.80	7.04	3.50	13.87	0.11
C5	-2.36	2.29	6.67	-7.99	-6.77	5.00	7.45	-15.93	7.17	179.22	8.07	4.07	17.02	0.03
R3	0.75	1.21	6.58	-4.13	-5.65	5.22	5.87	-16.26	5.70	172.44	6.72	4.00	16.41	0.05
N13	1.04	1.42	7.86	-5.24	-6.60	5.15	6.94	-17.84	6.60	171.05	7.40	4.29	18.43	0.00

	Air Temperature (°C)				Surface Temperature (°C)				Atmospheric Pressure (mb)				Insolation (mw/m²)			
	Mean	SD	Max	Min	Mean	SD	Max	Min	Mean	SD	Max	Min	Mean	SD	Max	Min
C2	10.95	1.51	18.22	7.32	10.34	1.68	15.40	8.00					25.07	31.19	98.94	0.00
C3	10.99	1.41	17.46	8.00	10.40	1.62	15.59	7.94					26.14	31.79	98.55	0.00
C4	11.13	1.39	16.81	8.53	10.58	1.43	14.64	8.04					20.80	27.78	97.03	0.00
C5	11.51	1.36	15.74	8.96	11.34	1.22	14.84	9.43								
N3	10.93	1.33	17.31	8.27	10.37	1.34	14.37	8.02					24.31	31.48	102.81	0.00
R3	10.95	1.40	16.94	7.94	10.63	1.65	15.31	7.99					26.39	32.76	100.18	0.00
N13	11.59	1.42	17.30	8.70	10.93	1.38	15.13	8.67	1016.18	3.15	1026.20	1007.50				
N14	11.81	1.59	18.40	8.60	11.65	1.38	16.29	8.83	1016.20	3.25	1027.20	1006.60				

	Cross-Shelf Wind Stress (dynes/cm²)				Along-Shelf Wind Stress (dynes/cm²)				Vector	Direction	Amplitude (dynes/cm²)			
	Mean	SD	Max	Min	Mean	SD	Max	Min	Mean	(Rel to 317°T)	Mean	SD	Max	Min
Pt. Arena	-0.25	0.46	1.32	2.69	-0.37	0.58	1.41	-3.66	0.45	214.05	0.59	0.63	3.94	0.00
Sea Ranch	-0.00	0.13	0.77	-0.55	-0.25	0.52	0.60	-4.09	0.25	179.79	0.32	0.50	4.14	0.00
Bodega Lab	0.15	0.25	1.61	-0.68	-0.38	0.62	0.73	-4.43	0.41	158.46	0.48	0.62	4.49	0.00
N14	-0.19	0.36	1.83	-2.10	-1.02	1.26	1.28	-6.98	1.04	190.55	1.14	1.21	7.12	0.00
N3	-0.34	0.38	0.50	-2.00	-1.06	1.07	1.10	-5.51	1.11	197.78	1.19	1.06	5.69	0.00
C2	0.00	0.30	2.24	-1.65	-1.13	2.14	1.96	-25.19	1.13	180.00	1.26	2.09	25.19	0.00
C3	0.13	0.27	1.69	-0.39	-1.22	1.38	1.11	-6.38	1.23	173.92	1.32	1.32	6.45	0.00
C4	-0.04	0.18	0.67	-0.86	-1.10	1.04	0.97	-4.37	1.10	182.08	1.18	0.97	4.41	0.00
C5	-0.55	0.62	0.81	2.90	-1.49	1.41	1.01	-7.28	1.59	200.26	1.66	1.46	7.84	0.00
R3	-0.14	0.20	1.08	-0.42	-1.14	1.32	0.65	-7.00	1.15	187.00	1.21	1.27	7.07	0.00
N13	0.15	0.24	1.79	-0.55	-1.12	1.20	0.73	-6.93	1.13	172.37	1.18	1.17	7.16	0.00

Number of points for each record is 2491 (103 days) from April 13 (0000) to July 25 (1800).

formulaes for the Richardson number and stability parameter Z/L (where Z is the observation height and L the Monin-Obukhov length scale). Mills and Beardsley (1983) used this formulation to consider the influence of stratification on the derived wind stress in CODE-1: they concluded that while the observed stratification in the marine boundary layer will cause τ_{on} to overestimate the actual wind stress, the error should be less than 10% for most of the data collected in CODE-1 and CODE-2. Finally, Large and Pond (1981) suggest that due to the finite time required for the sea state to equilibrate with the wind field, C_{dn} is smaller during rising winds and larger during rapidly decreasing winds or large changes in the wind direction. The emphasis in CODE is on the response of the shelf to strong forcing, and the neutral stability formulation is a reasonable approximation at the higher wind speeds in excess of ~ 4 m/sec.

D. DATA PRESENTATION

The coastal and moored meteorological data collected in CODE-2 are presented here in the form of time series plots of wind and other variables, scatter plots of wind, plots of mean wind and wind stress, and tables of standard statistics for all variables. The statistics were computed over the common time period 0000 GMT April 13, 1982 to 1800 GMT July 25, 1982; the time series and scatter plots are based on the same period. The variable-versus-time and the vector-versus-time plots were generated using the basic one hour time series subsampled every four hours.

The basic along- and cross-shelf wind components time series measured at sensor height are shown in Figures 3 and 4. These figures show that the wind is predominantly southward and southwestward and polarized in the along-shelf direction, i.e., the cross-shelf component is weaker than the along-shelf component at each site. The major along-shelf low-frequency wind fluctuations appear coherent over the array. The seabreeze, most noticeable at C2 in late April and early May, has a definite offshore decay since little diurnal variability is clear at C5. The observed air and 1 m seawater temperatures are shown in Figures 5 and 6. Daily insolation (Figure 7) and atmospheric pressure (Figure 8), and relative humidity (Figure 9) are also coherent over the array. The basic along- and cross-shelf wind components and vector wind time series are shown in Figures 10 to 20, and standard statistics for these series are given in Table 3. Scatter plots of along- versus cross-shelf components for the individual records (except NDBO-14) are given in Figure 21. These plots clearly illustrate the consistent polarization of the wind fluctuations at each site. The mean observed wind and standard deviations along the principal axes are shown in Figure 22.

Time series plots of the computed neutral wind stress are shown in Figures 23 to 35. The mean wind stress and standard deviations along the principal axes are shown in Figure 36; statistics for the derived stress time series are also given in Table 3.

Acknowledgments

These data have been collected through the collaboration of many individuals, whose help we want to acknowledge here. C. Winant, A. Bratkovich, S. Lentz, and others at SIO, set up and maintained the Sea Ranch and Bodega Bay stations and supplied us with edited data. J. Allen and G. Halliwell

supplied the NDBO buoy and Pt. Arena lighthouse wind data. The VAWR/Gill instruments were developed primarily by J. Dean and J. Poirier at WHOI. The WHOI meteorological array was deployed and recovered with great skill by the WHOI Buoy Group. This research was supported by the National Science Foundation.

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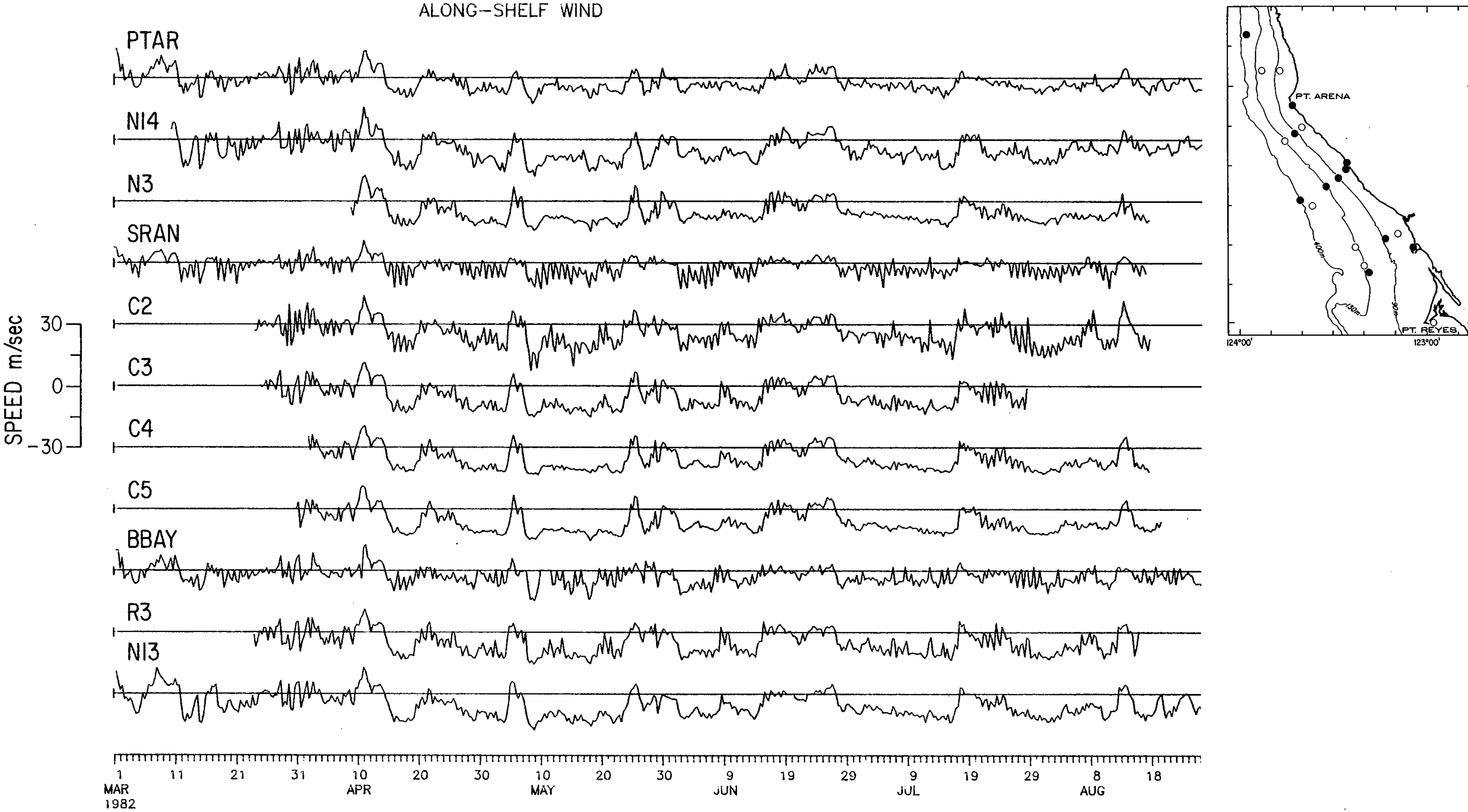


ALONG-SHELF WIND
PTAR
NI4
N3
SRAN
C2
C3
C4
C5
BBAY
R3
NI3
SPEED m/sec
30
0
-30
1
MAR
1982
11
21
31
10
APR
20
30
10
MAY
20
30
9
JUN
19
29
9
JUL
19
29
8
AUG
18
PT. ARENA
PT. REYES
39°00'
38°00'
124°00'
123°00'

Figure 3

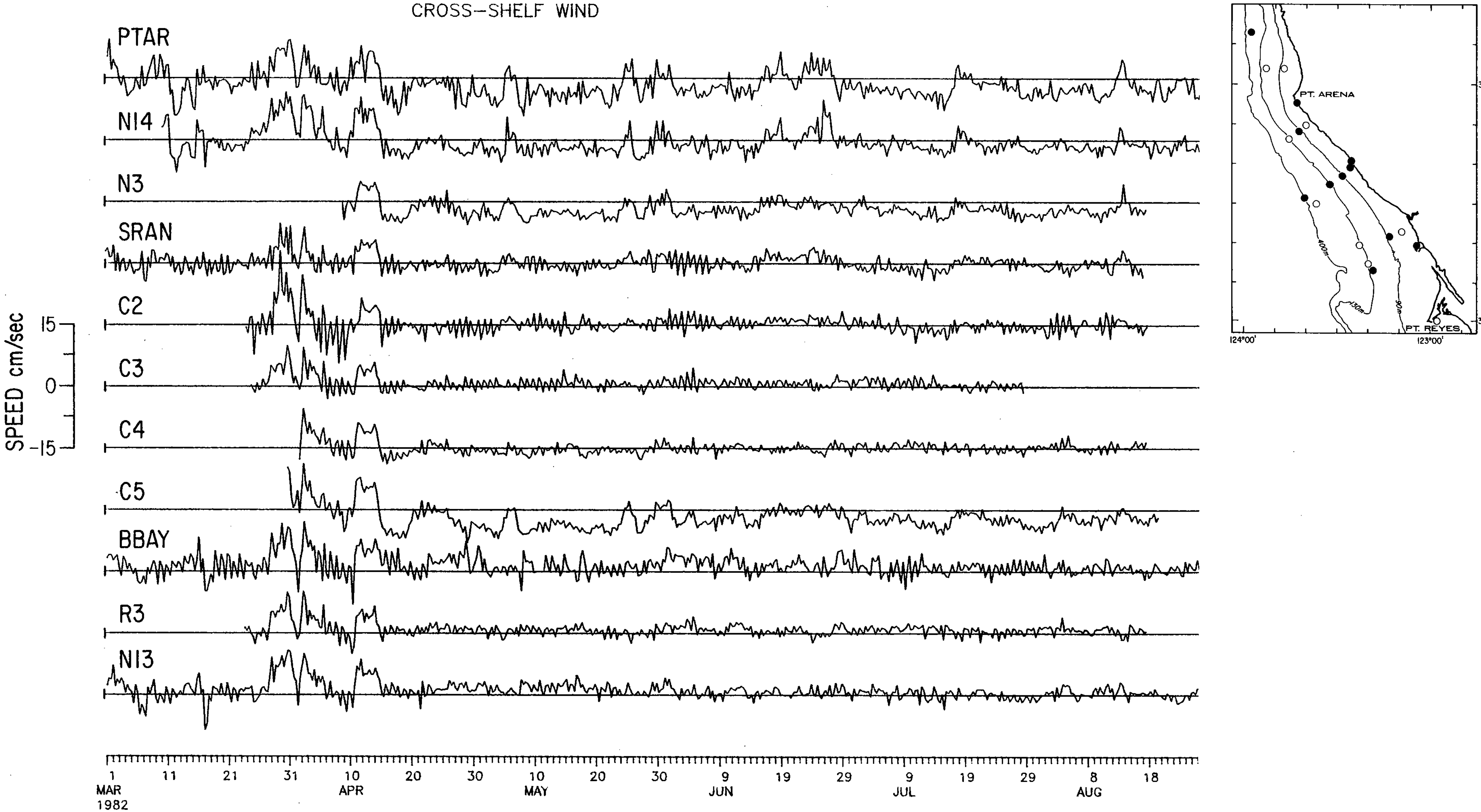

CROSS-SHELF WIND
PTAR
N14
N3
SRAN
C2
C3
C4
C5
BBAY
R3
N13
SPEED cm/sec
15
0
-15
1
11
21
31
10
20
30
10
20
30
9
19
29
9
19
29
8
18
MAR
1982
APR
MAY
JUN
JUL
AUG
PT. ARENA
PT. REYES
39°00'
38°00'
124°00'
123°00'

Figure 4

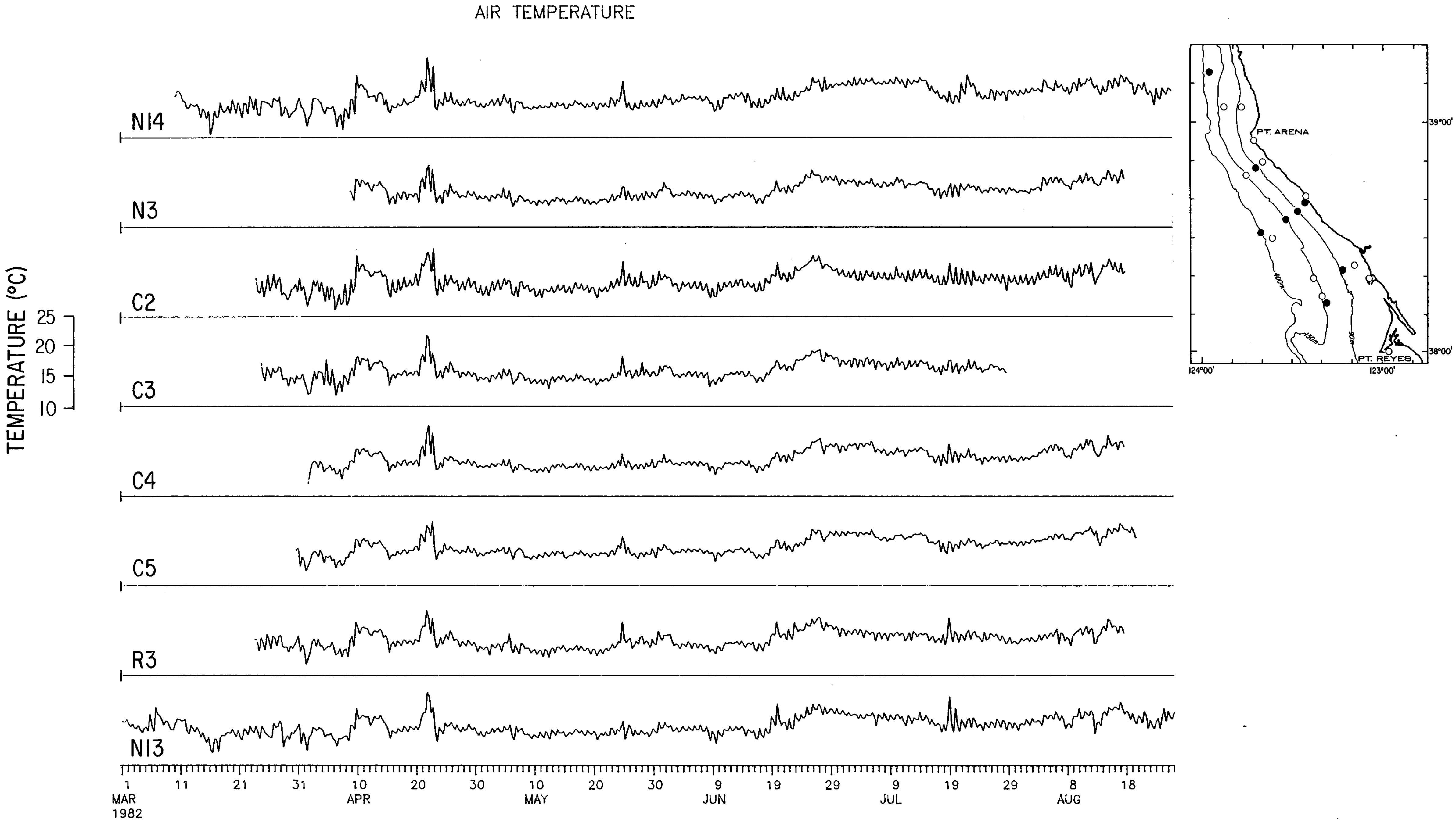

AIR TEMPERATURE
TEMPERATURE (°C)
25
20
15
10
N14
N3
C2
C3
C4
C5
R3
N13
1
11
21
31
10
20
30
10
20
30
9
19
29
9
19
29
8
18
MAR
1982
APR
MAY
JUN
JUL
AUG
PT. ARENA
PT. REYES
39°00'
38°00'
124°00'
123°00'

Figure 5

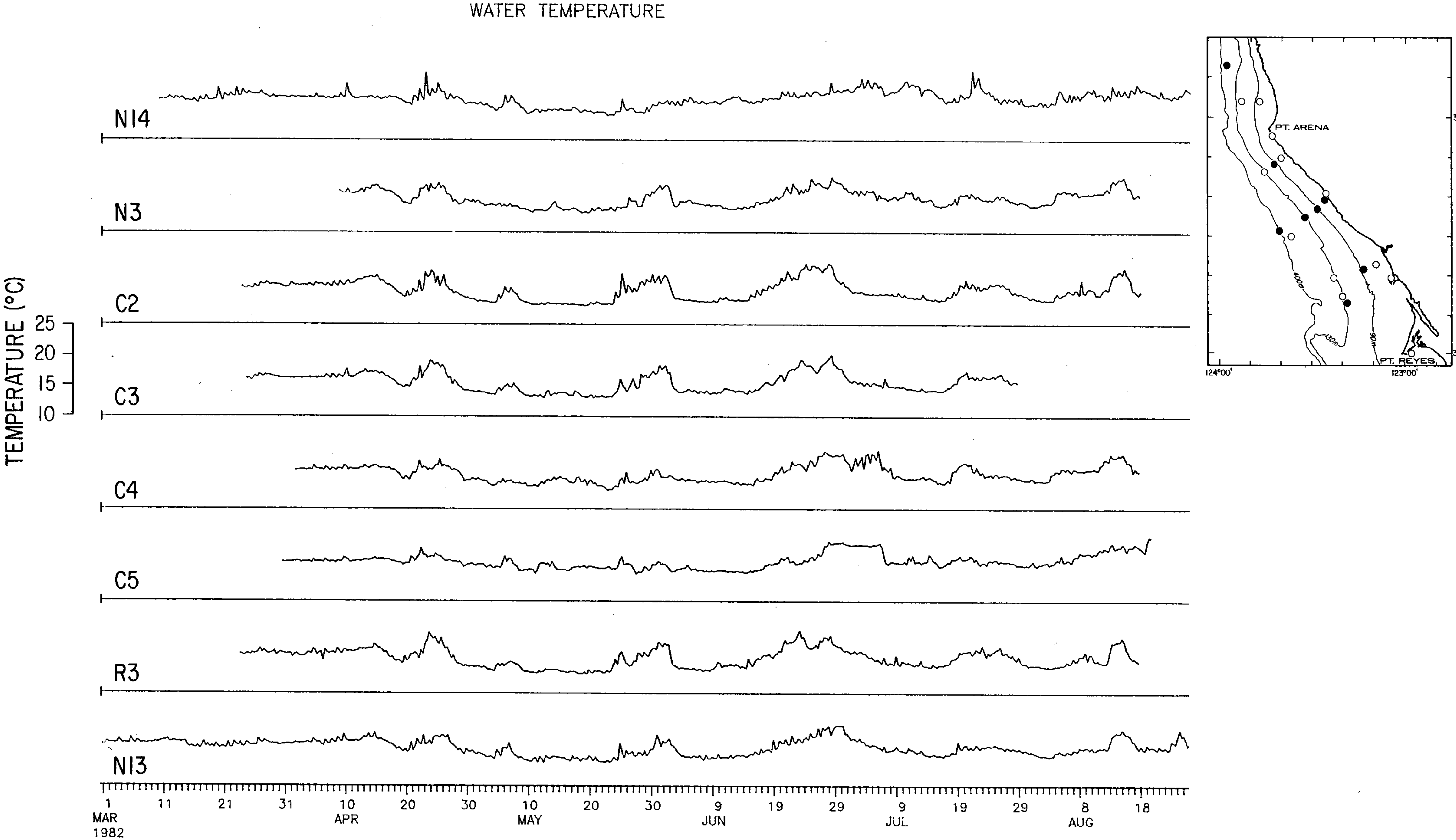
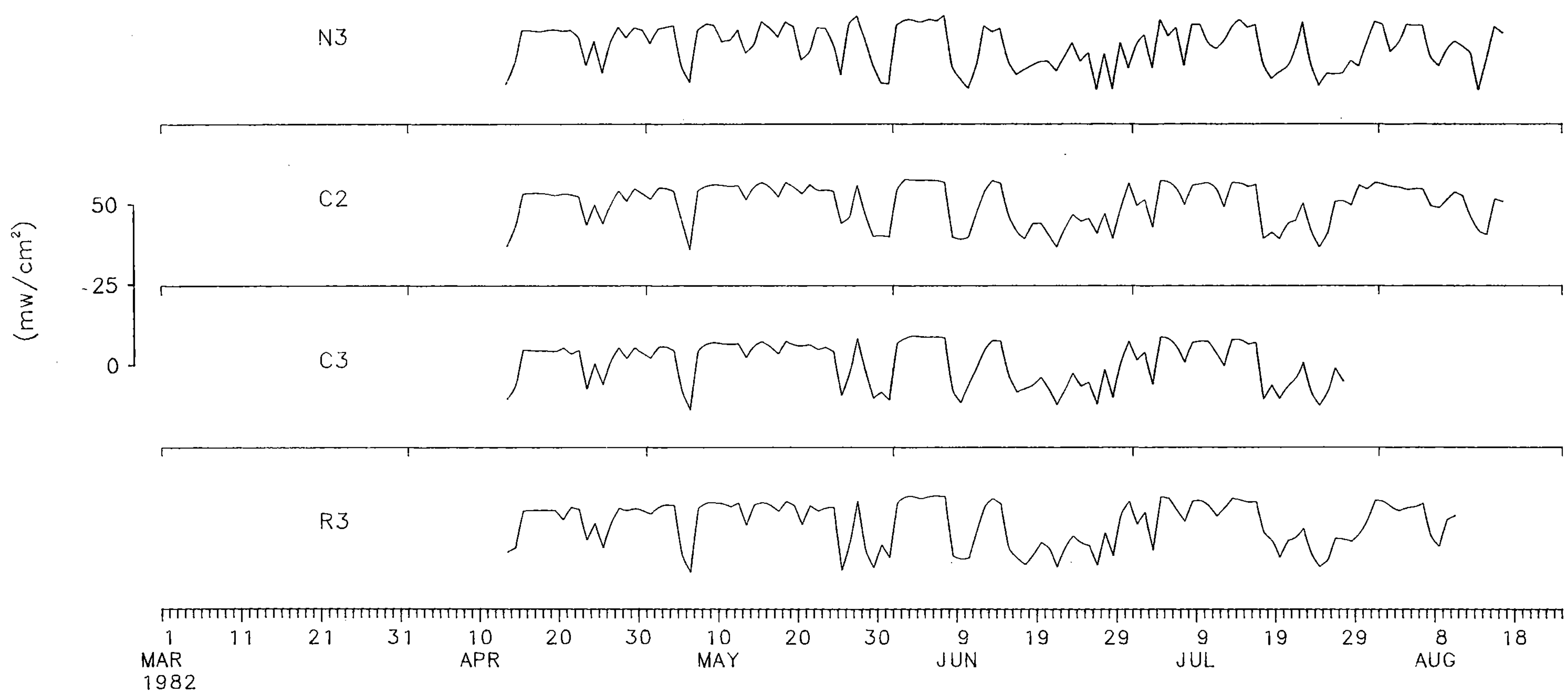

WATER TEMPERATURE
N14
N3
C2
C3
C4
C5
R3
N13
TEMPERATURE (°C)
25
20
15
10
1
MAR
1982
11
21
31
10
APR
20
30
10
MAY
20
30
9
JUN
19
29
9
JUL
19
29
8
AUG
18
PT. ARENA
PT. REYES
39°00'
38°00'
124°00'
123°00'
400m
130m
90m

Figure 6

INSOLATION



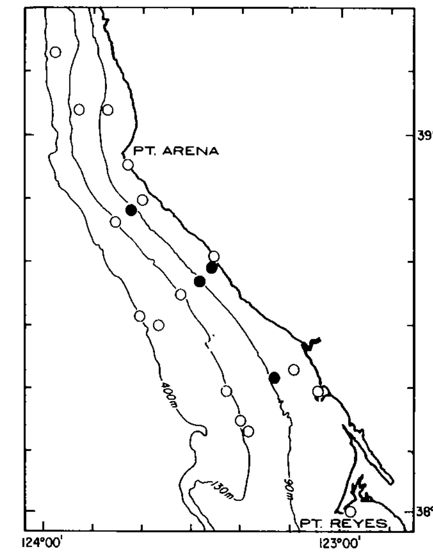
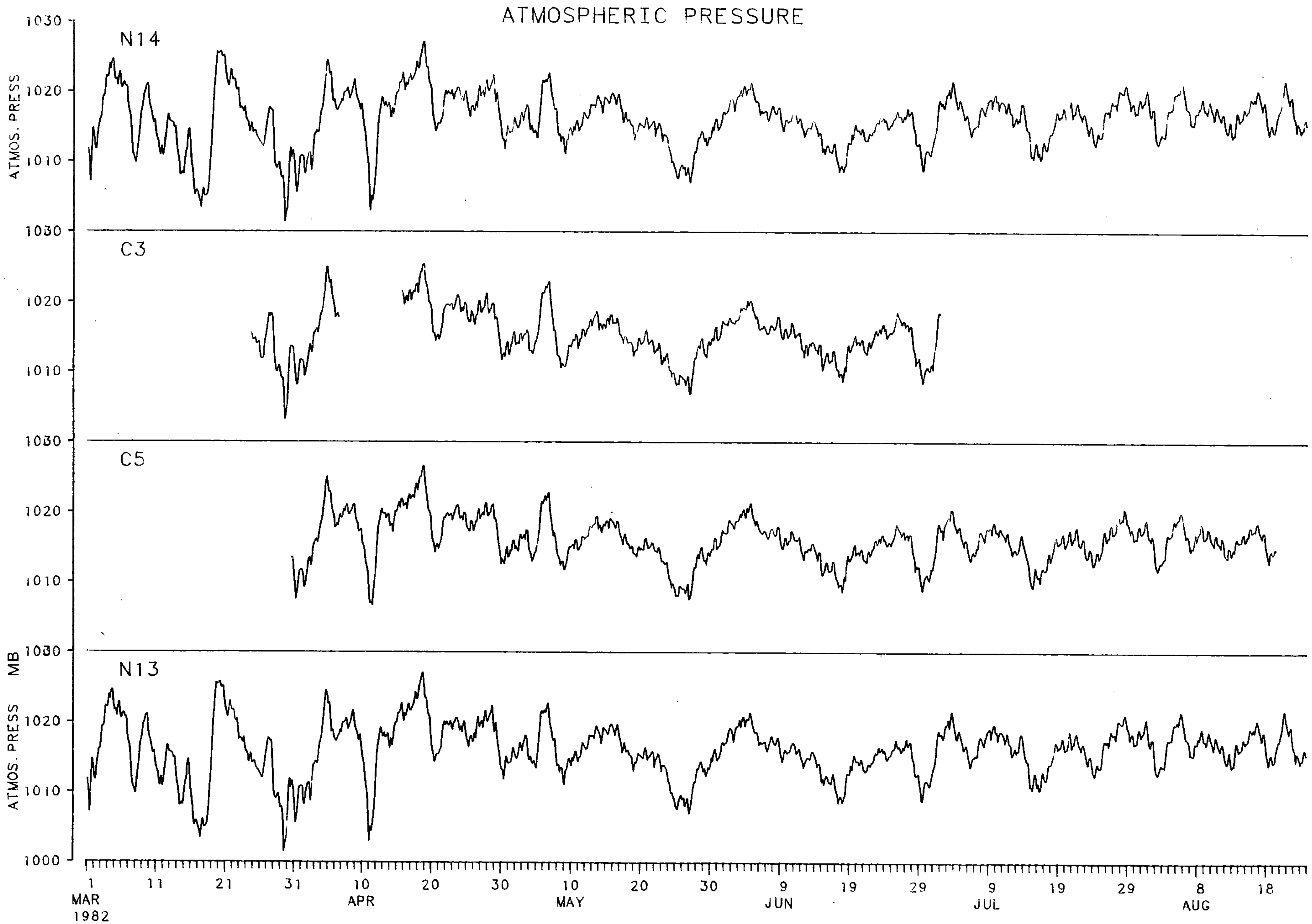


Figure 7


ATMOSPHERIC PRESSURE
N14
C3
C5
N13
ATMOS. PRESS MB
1030
1020
1010
1000
1
MAR
1982
11
21
31
10
APR
20
30
10
MAY
20
30
9
JUN
19
29
9
JUL
19
29
8
AUG
18

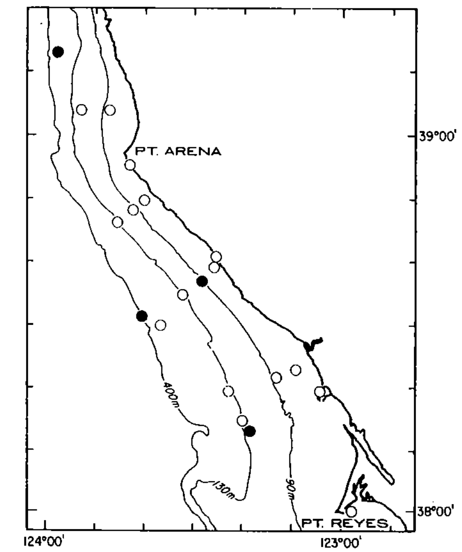
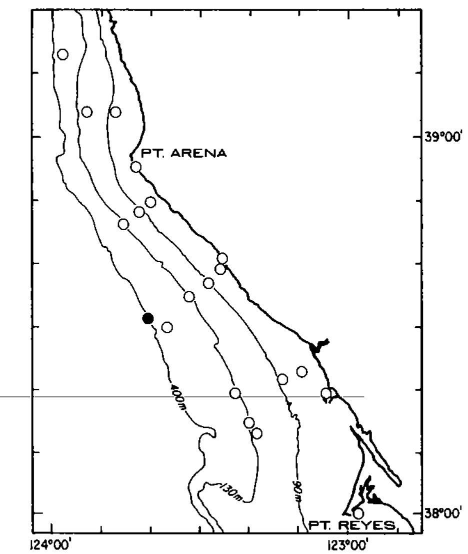

PT. ARENA
PT. REYES
39°00'
38°00'
124°00'
123°00'
400m
130m
90m

Figure 8


PT. ARENA
PT. REYES
39°00'
38°00'
124°00'
123°00'
400m
130m
90m

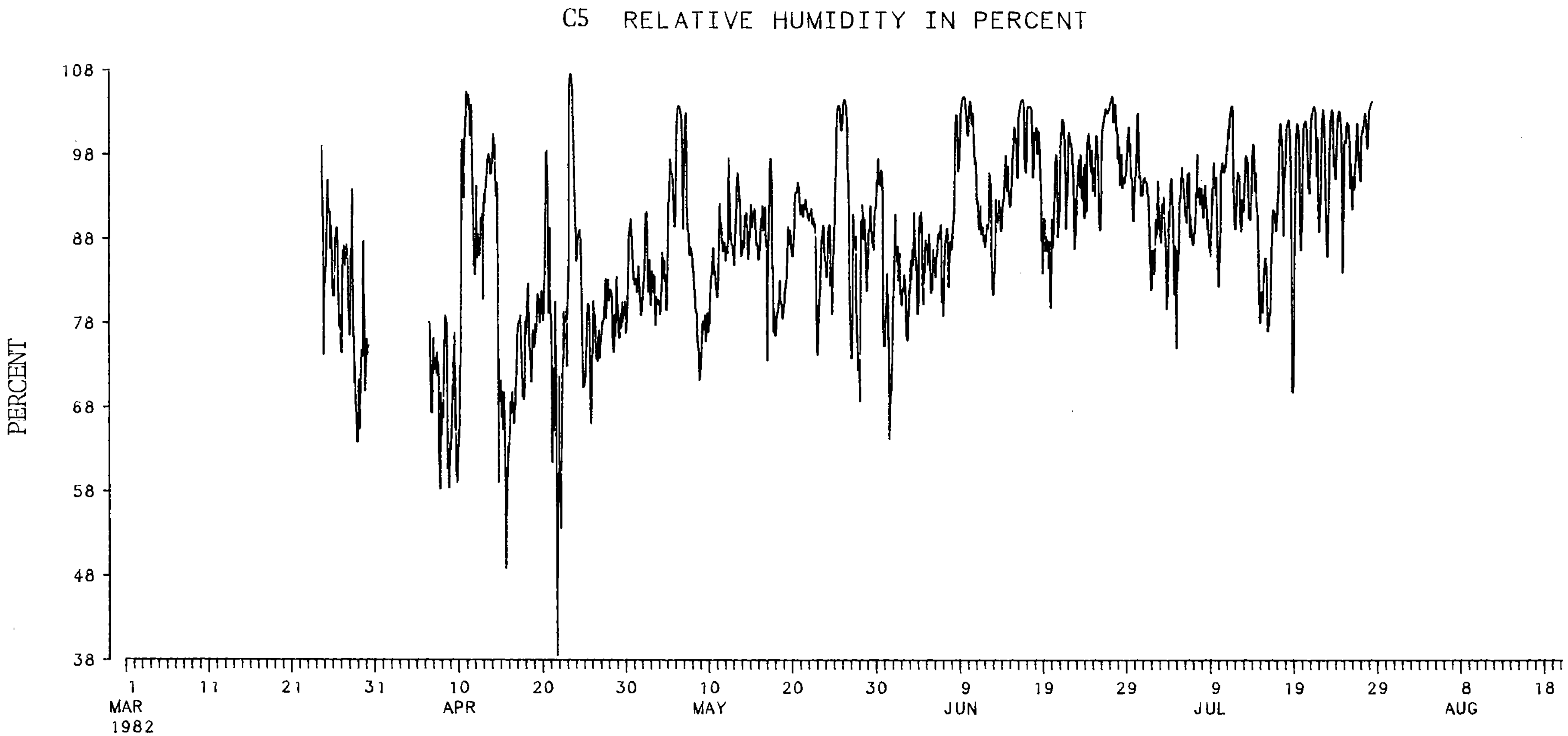
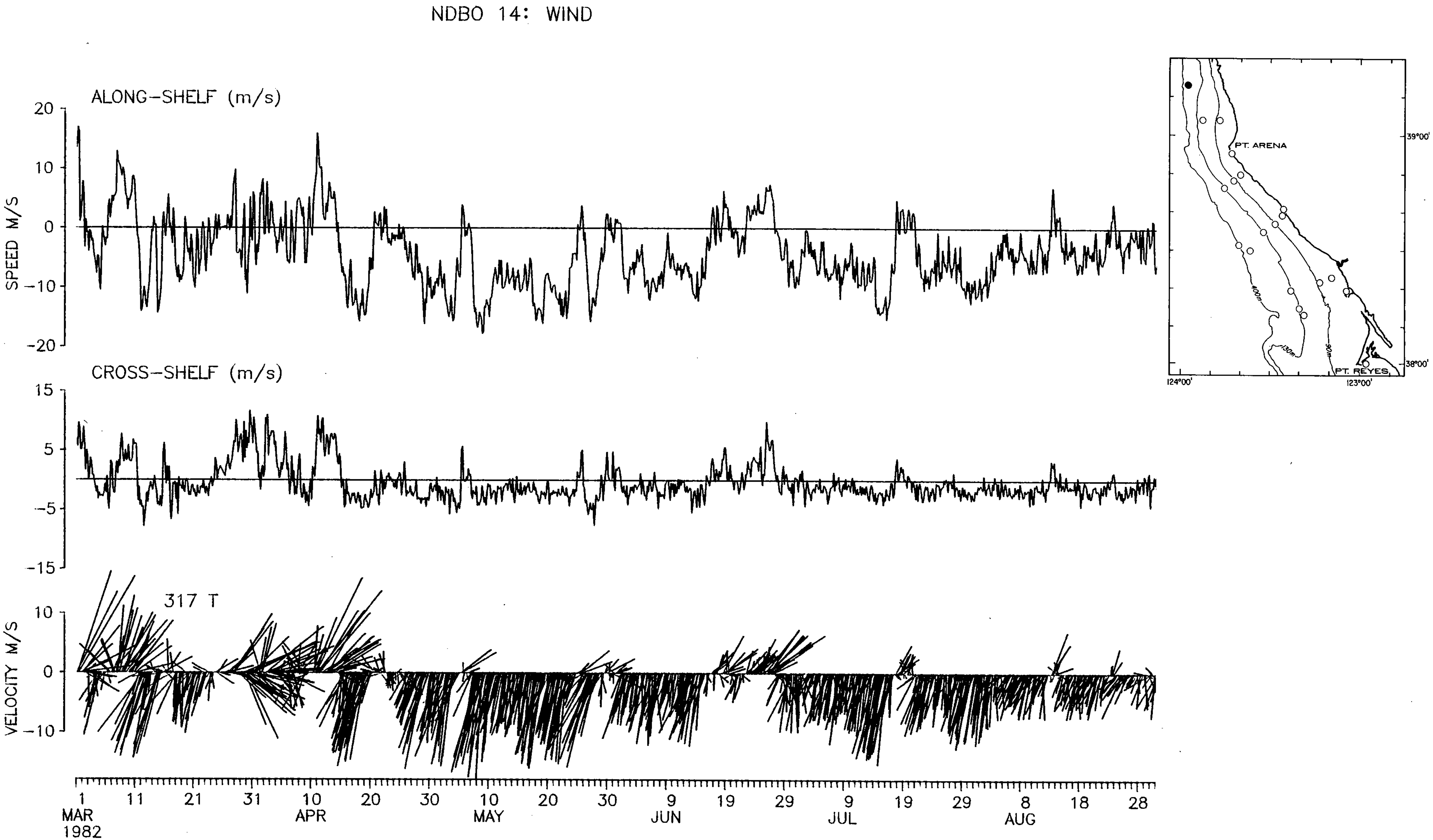

C5 RELATIVE HUMIDITY IN PERCENT
PERCENT
108
98
88
78
68
58
48
38
1
MAR
1982
11
21
31
10
APR
20
30
10
MAY
20
30
9
JUN
19
29
9
JUL
19
29
8
AUG
18

Figure 9



NDBO 14: WIND
ALONG-SHELF (m/s)
CROSS-SHELF (m/s)
317 T
SPEED M/S
VELOCITY M/S
20
10
0
-10
-20
15
5
-5
-15
1
MAR
1982
11
21
31
10
APR
20
30
10
MAY
20
30
9
JUN
19
29
9
JUL
19
29
8
AUG
18
28
PT. ARENA
PT. REYES
39°00'
38°00'
124°00'
123°00'
400m
130m
90m

Figure 10

PT. ARENA LIGHT WIND

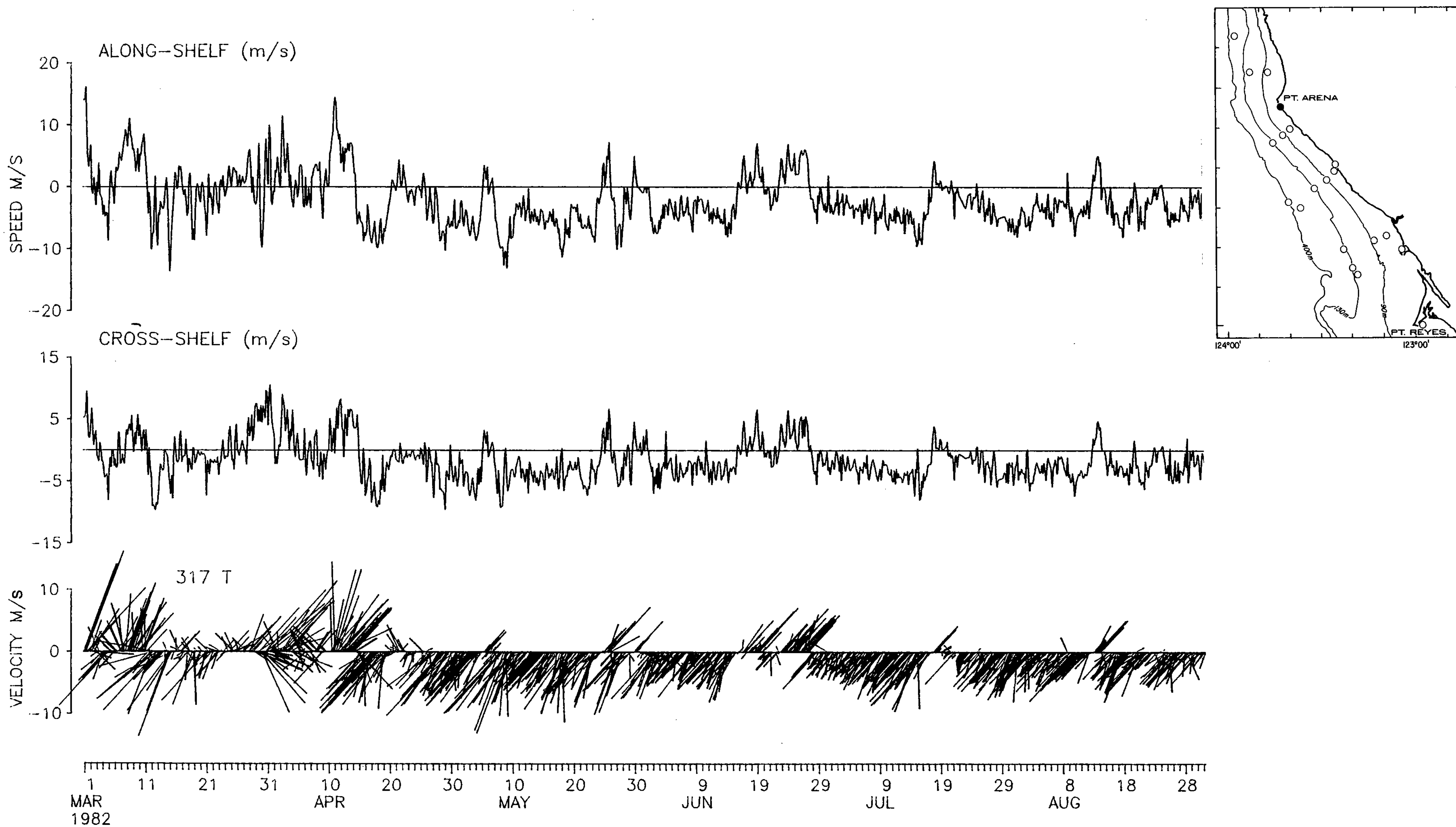


Figure 11

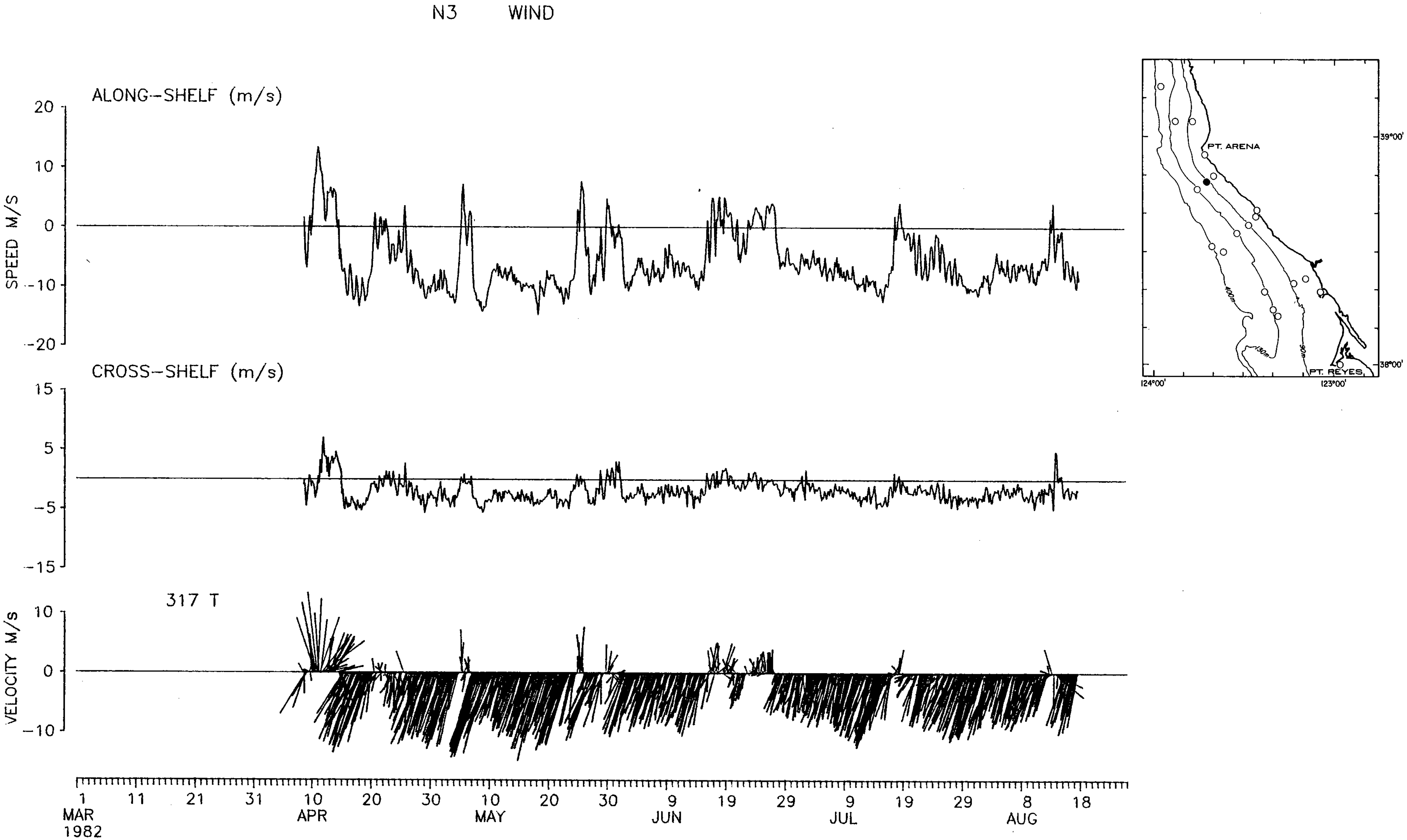
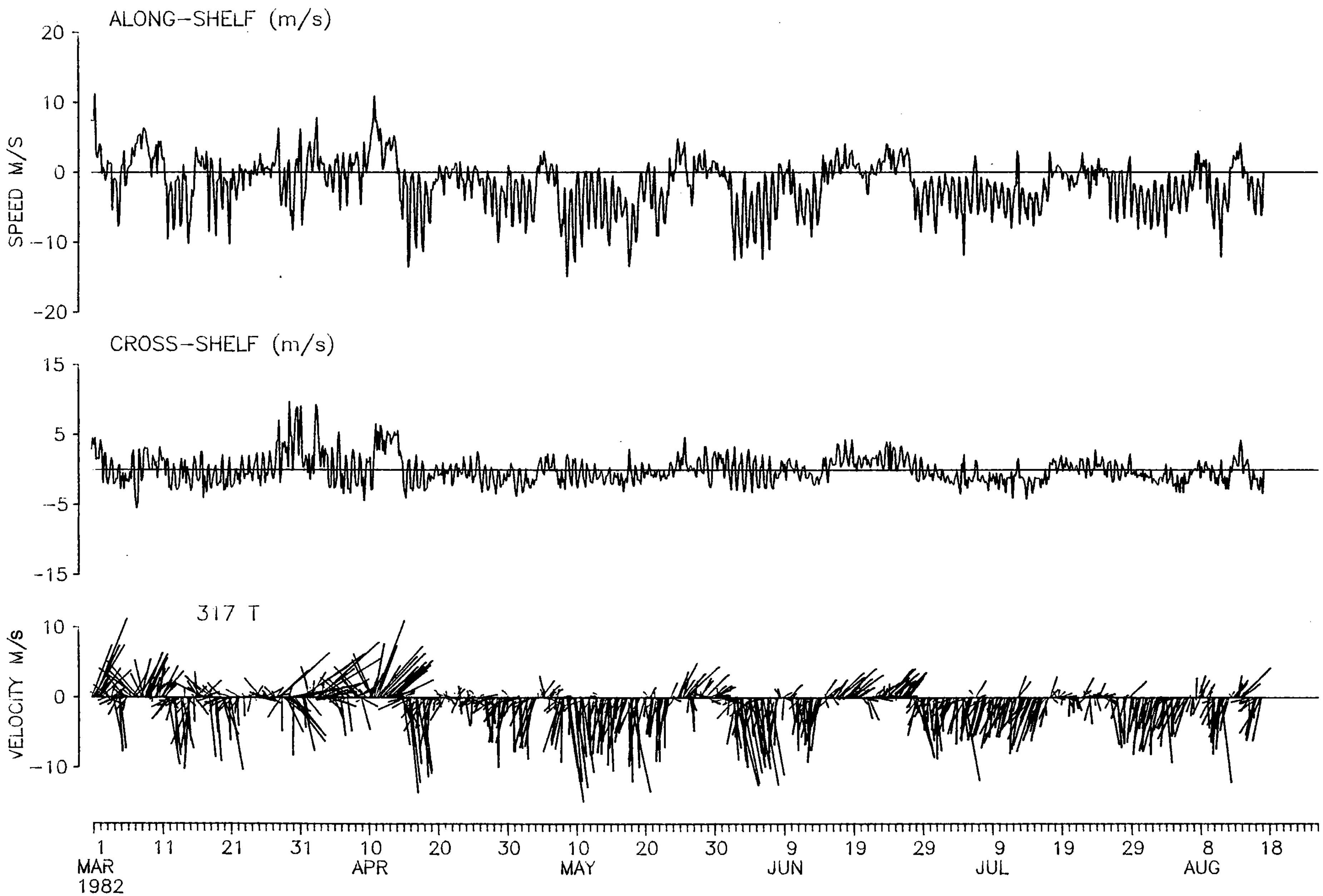

N3 WIND
ALONG-SHELF (m/s)
SPEED M/S
20
10
0
-10
-20
CROSS-SHELF (m/s)
15
5
-5
-15
317 T
VELOCITY M/S
10
0
-10
1 11 21 31 10 20 30 10 20 30 9 19 29 9 19 29 8 18
MAR
1982
APR
MAY
JUN
JUL
AUG
PT. ARENA
PT. REYES
39°00'
38°00'
124°00'
123°00'
400m
150m
90m

Figure 12

SEA RANCH: WIND



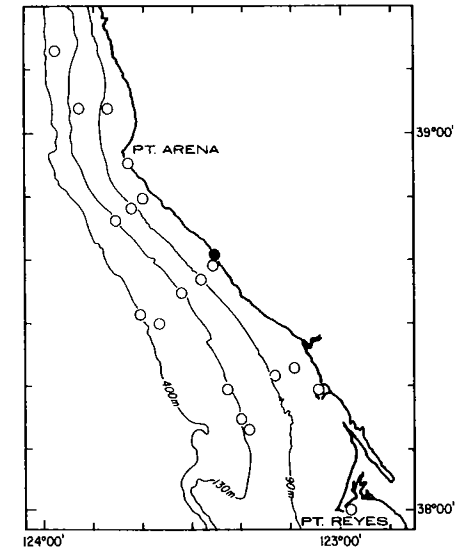


Figure 13

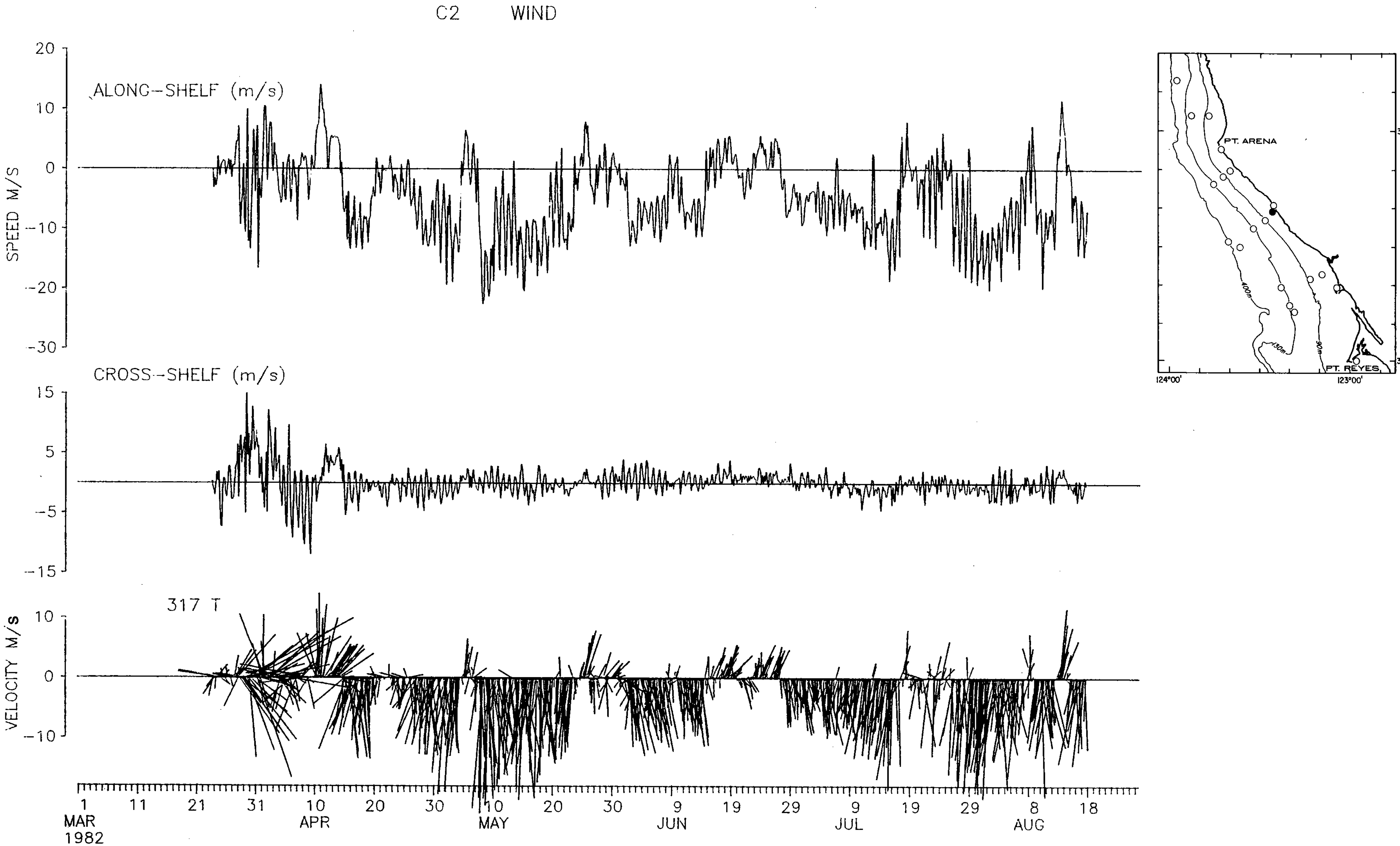

C2 WIND
ALONG-SHELF (m/s)
SPEED M/S
CROSS-SHELF (m/s)
317 T
VELOCITY M/S
MAR
1982
APR
MAY
JUN
JUL
AUG
PT. ARENA
PT. REYES
400m
130m
90m
39°00'
38°00'
124°00'
123°00'

Figure 14

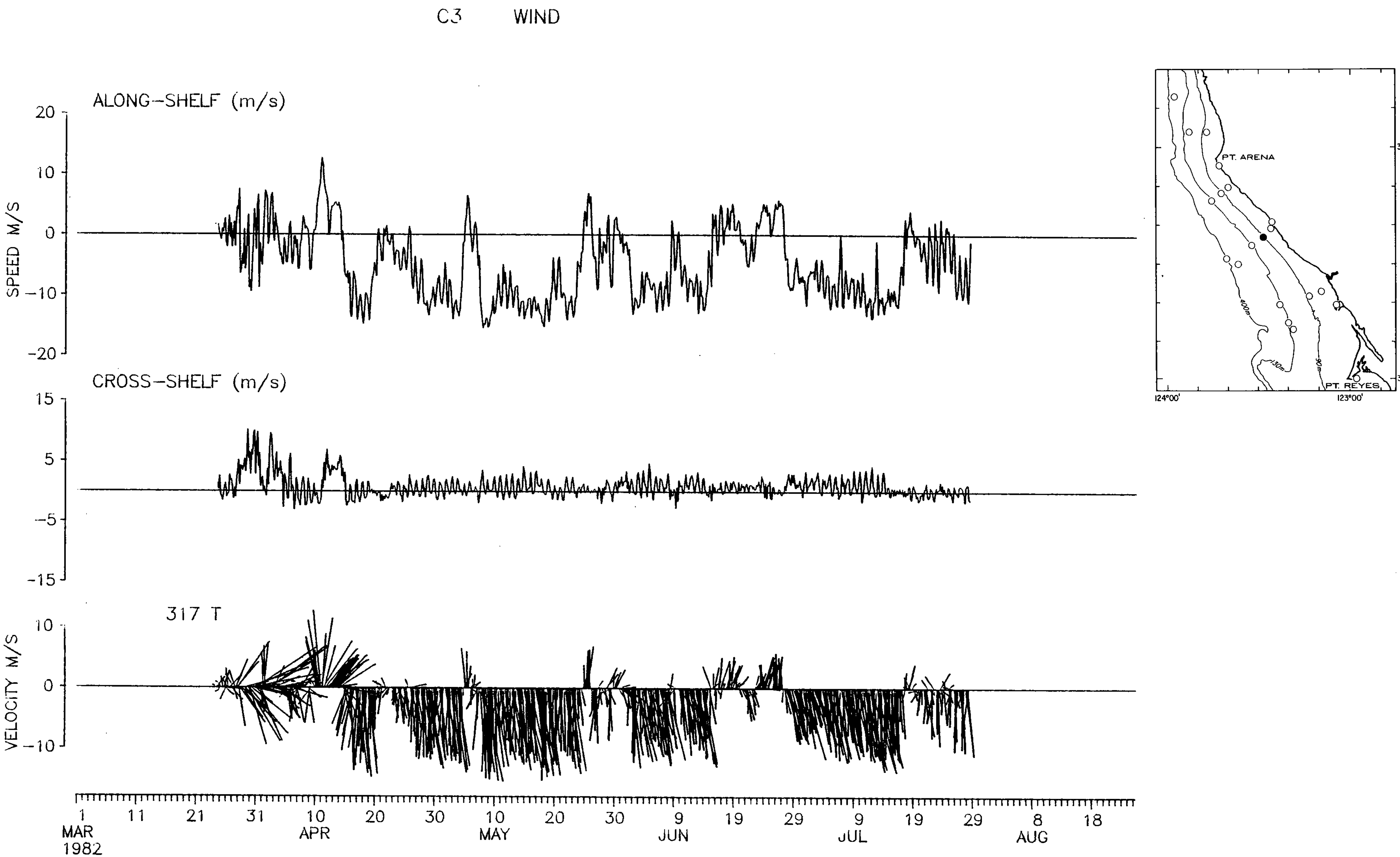

C3 WIND
ALONG-SHELF (m/s)
SPEED M/S
20
10
0
-10
-20
CROSS-SHELF (m/s)
15
5
-5
-15
317 T
VELOCITY M/S
10
0
-10
1
11
21
31
10
20
30
10
20
30
9
19
29
9
19
29
8
18
MAR
1982
APR
MAY
JUN
JUL
AUG
PT. ARENA
PT. REYES
39°00'
38°00'
124°00'
123°00'
400m
130m
90m

Figure 15

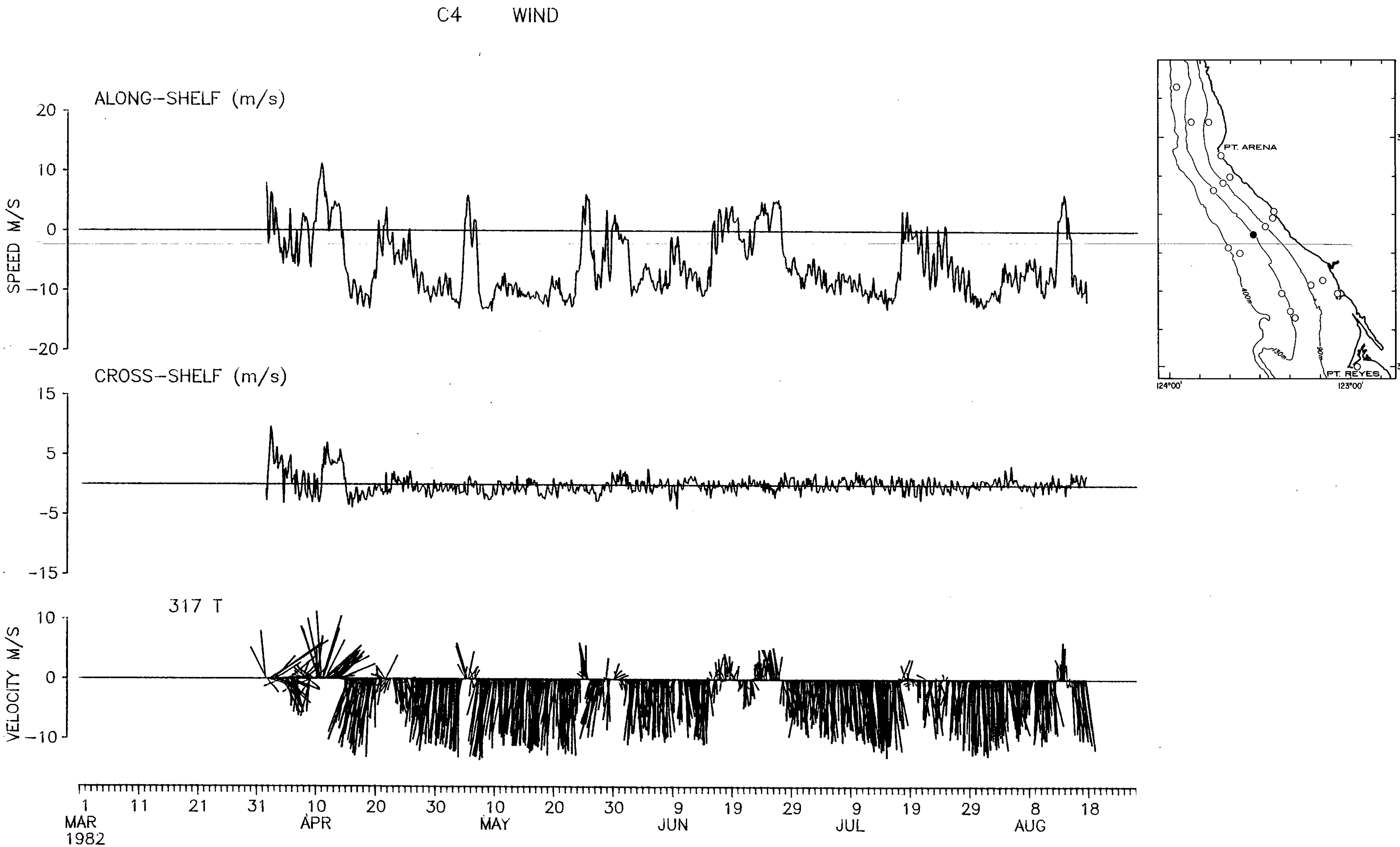

C4 WIND
ALONG-SHELF (m/s)
SPEED M/S
20
10
0
-10
-20
CROSS-SHELF (m/s)
15
5
-5
-15
317 T
VELOCITY M/S
10
0
-10
1 11 21 31 10 20 30 10 20 30 9 19 29 9 19 29 8 18
MAR
1982
APR
MAY
JUN
JUL
AUG
PT. ARENA
PT. REYES
39°00'
38°00'
124°00'
123°00'
400m
130m
90m

Figure 16

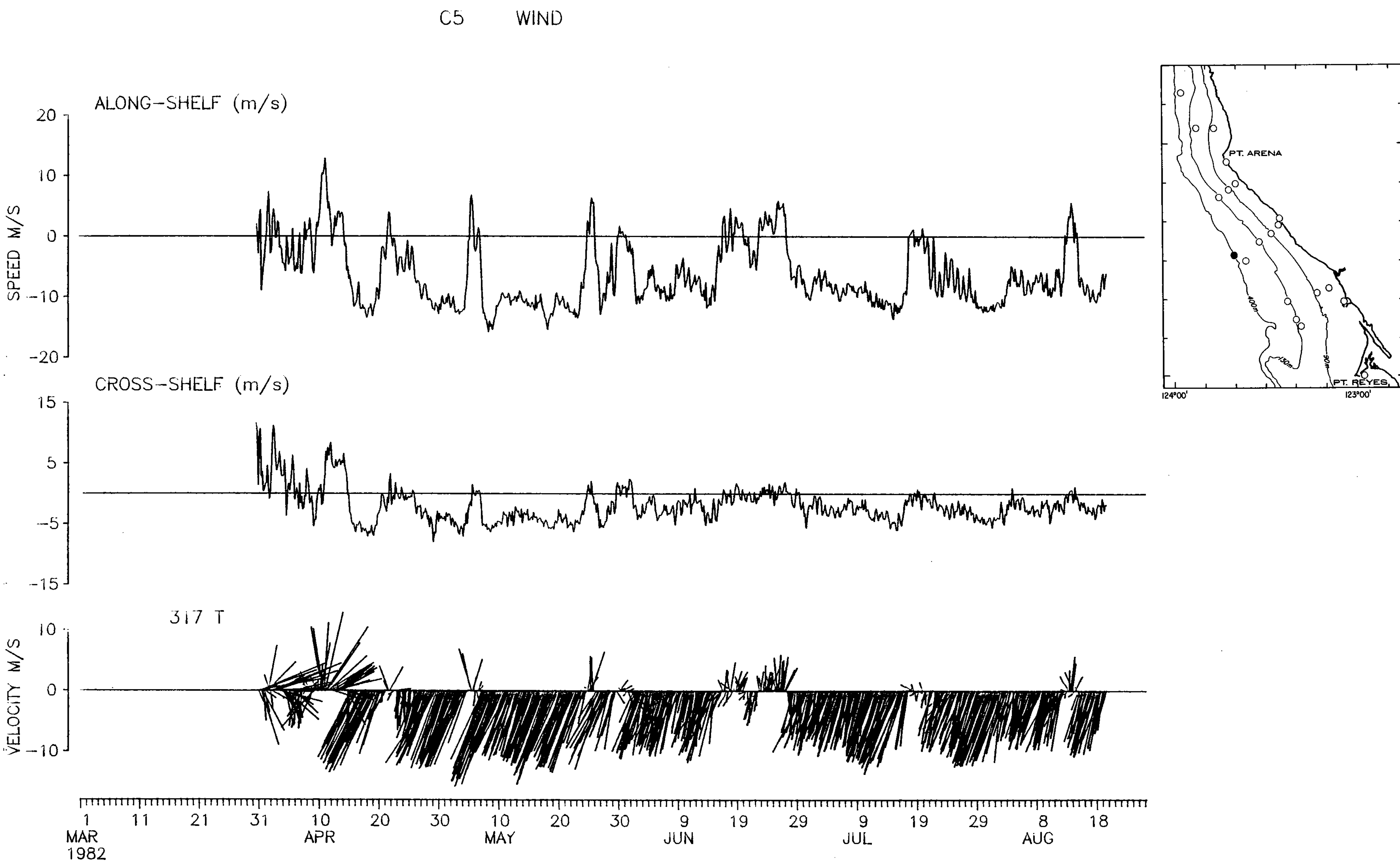

C5 WIND
ALONG-SHELF (m/s)
SPEED M/S
20
10
0
-10
-20
CROSS-SHELF (m/s)
15
5
-5
-15
317 T
VELOCITY M/S
10
0
-10
1
MAR
1982
11
21
31
10
APR
20
30
10
MAY
20
30
9
JUN
19
29
9
JUL
19
29
8
AUG
18
PT. ARENA
PT. REYES
39°00'
38°00'
124°00'
123°00'
400m
150m
90m

Figure 17

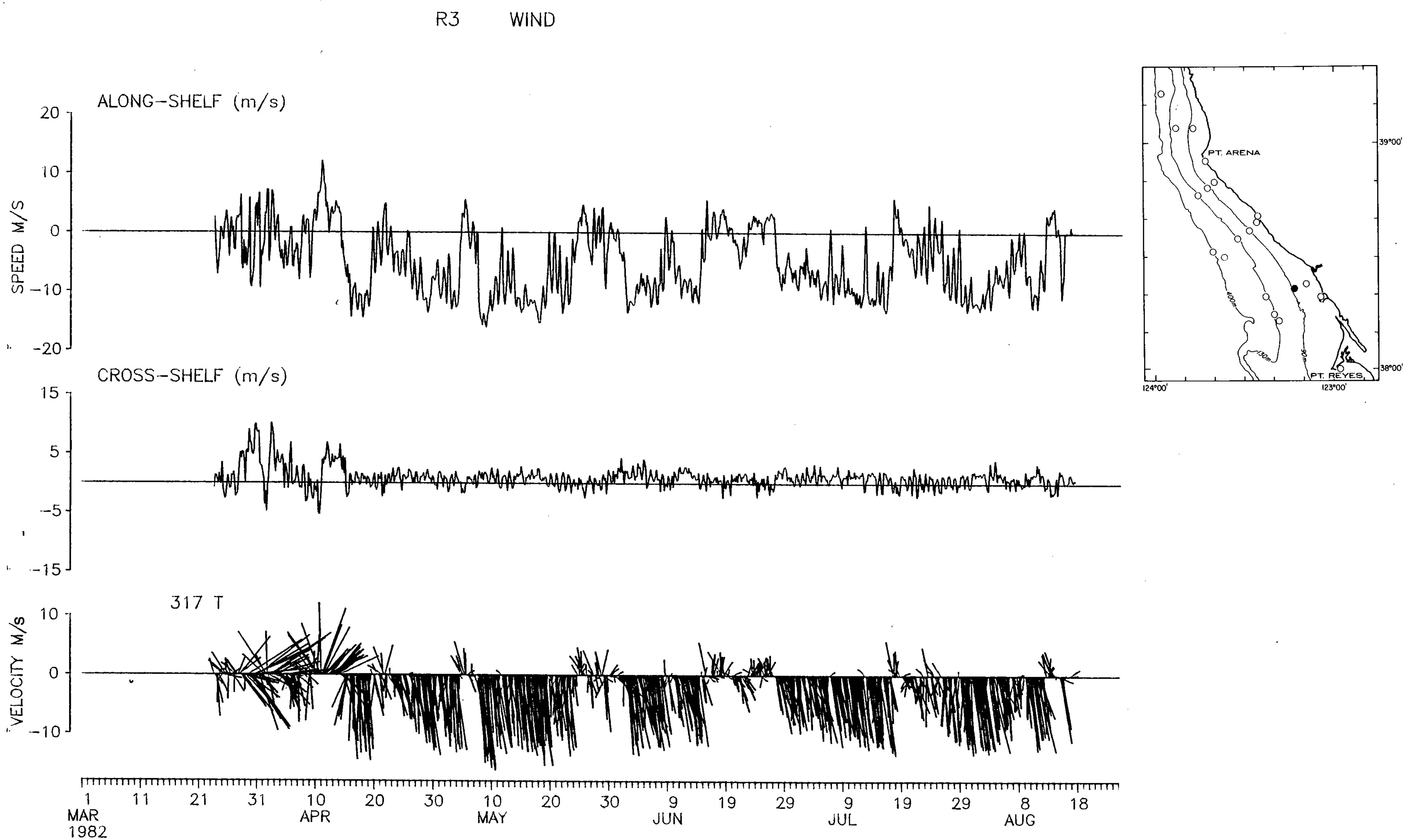
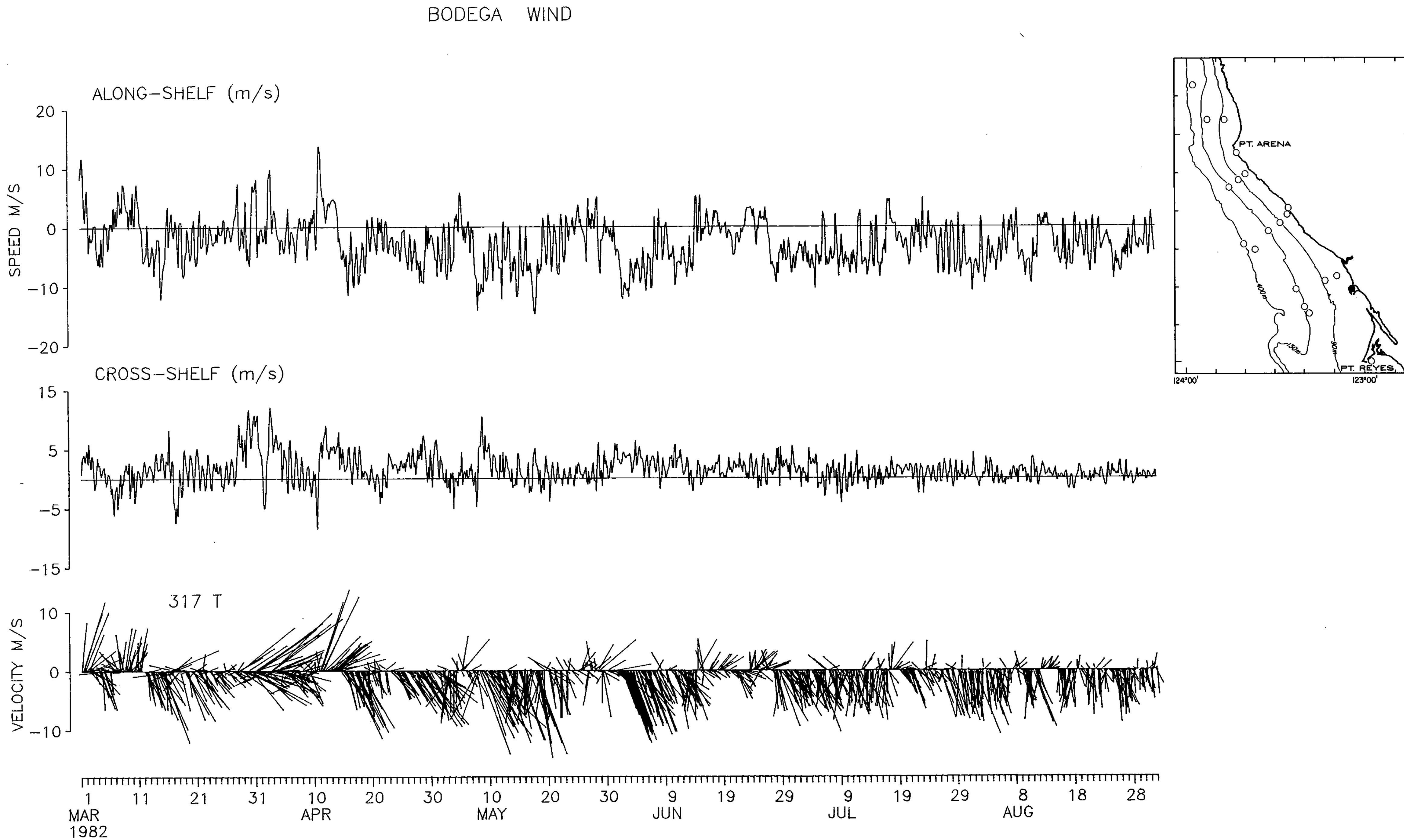

R3 WIND
ALONG-SHELF (m/s)
SPEED M/S
20
10
0
-10
-20
CROSS-SHELF (m/s)
15
5
-5
-15
317 T
VELOCITY M/s
10
0
-10
1 11 21 31 10 20 30 10 20 30 9 19 29 9 19 29 8 18
MAR
1982
APR
MAY
JUN
JUL
AUG
PT. ARENA
PT. REYES
39°00'
38°00'
124°00'
123°00'
400m
130m
90m

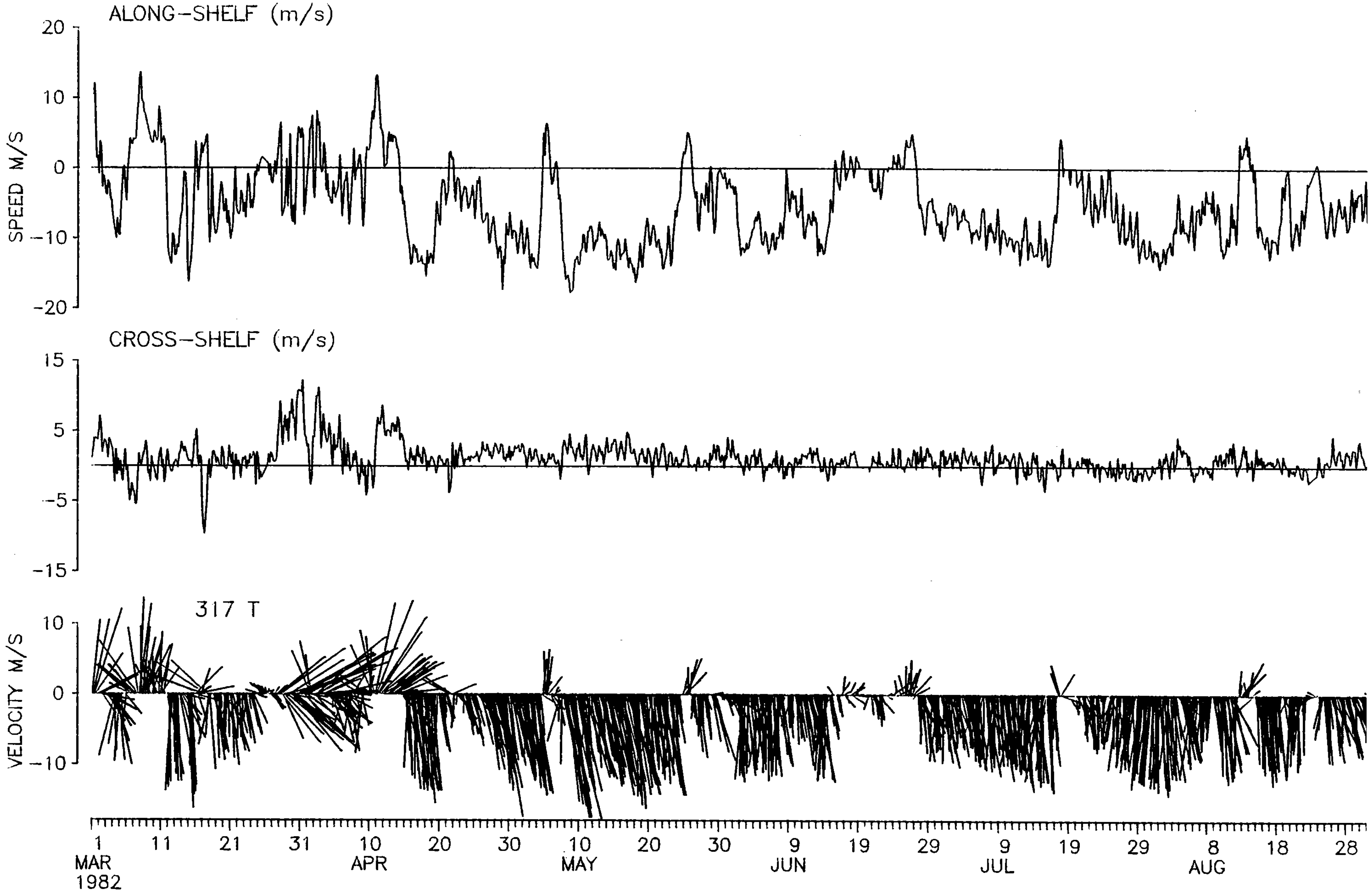
Figure 18



BODEGA WIND
ALONG-SHELF (m/s)
SPEED M/S
20
10
0
−10
−20
CROSS-SHELF (m/s)
15
5
−5
−15
317 T
VELOCITY M/S
10
0
−10
1
MAR
1982
11
21
31
10
APR
20
30
10
MAY
20
30
9
JUN
19
29
9
JUL
19
29
8
AUG
18
28
PT. ARENA
PT. REYES
39°00'
38°00'
124°00'
123°00'
400m
130m
90m

Figure 19

NDBO 13: WIND



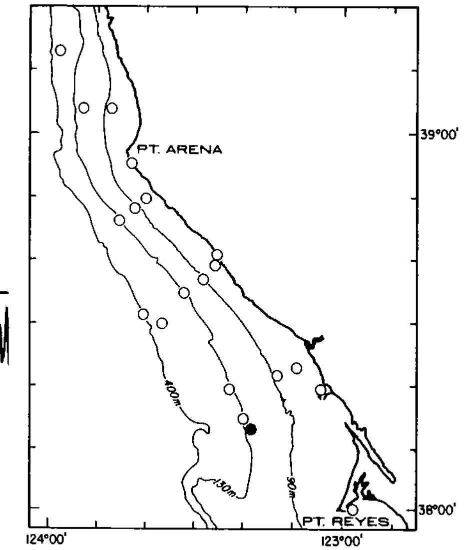


Figure 20

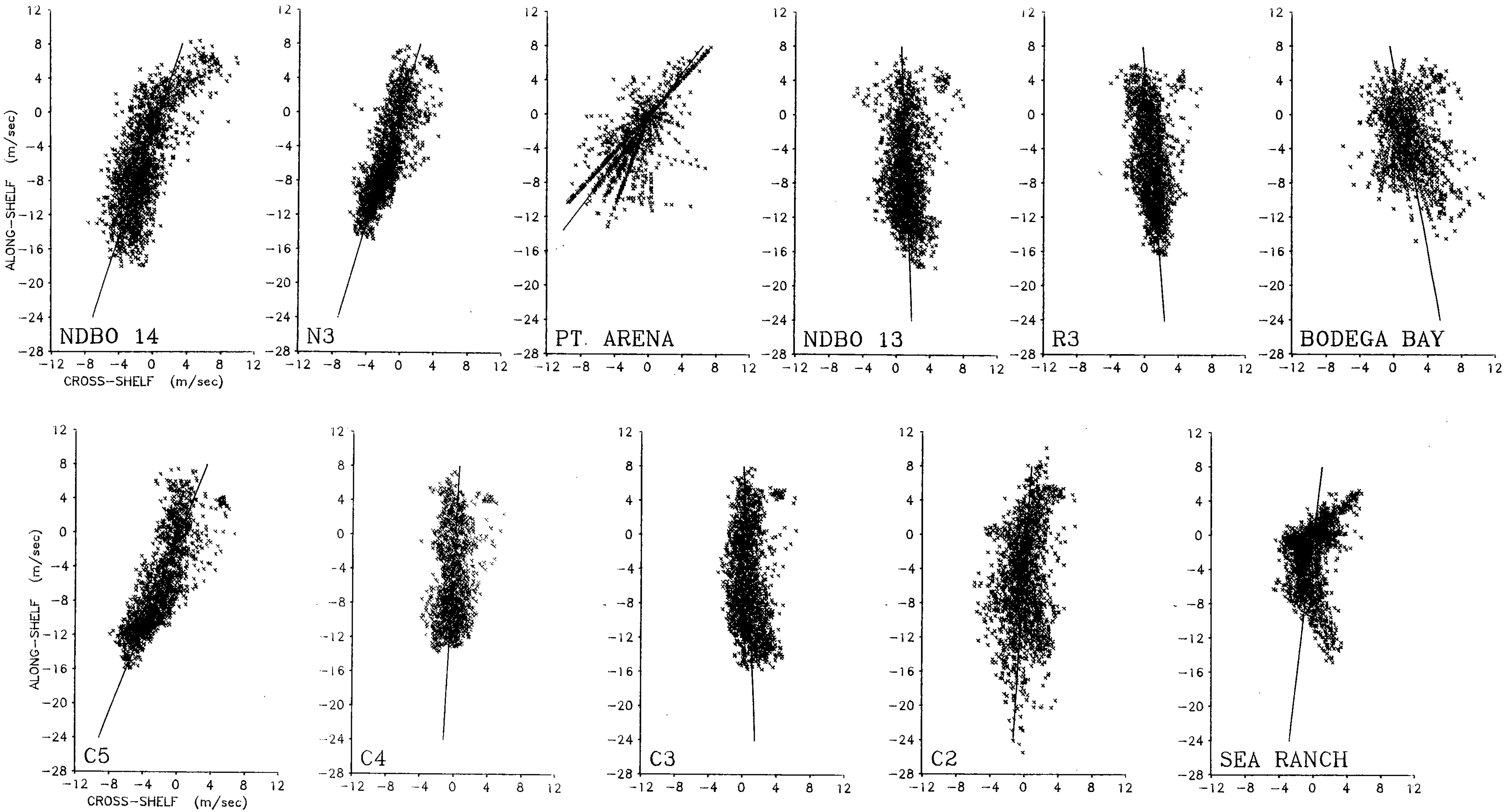


Figure 21. Scatter plots of observed wind time series. Lines show orientation of principal axis for each time series.

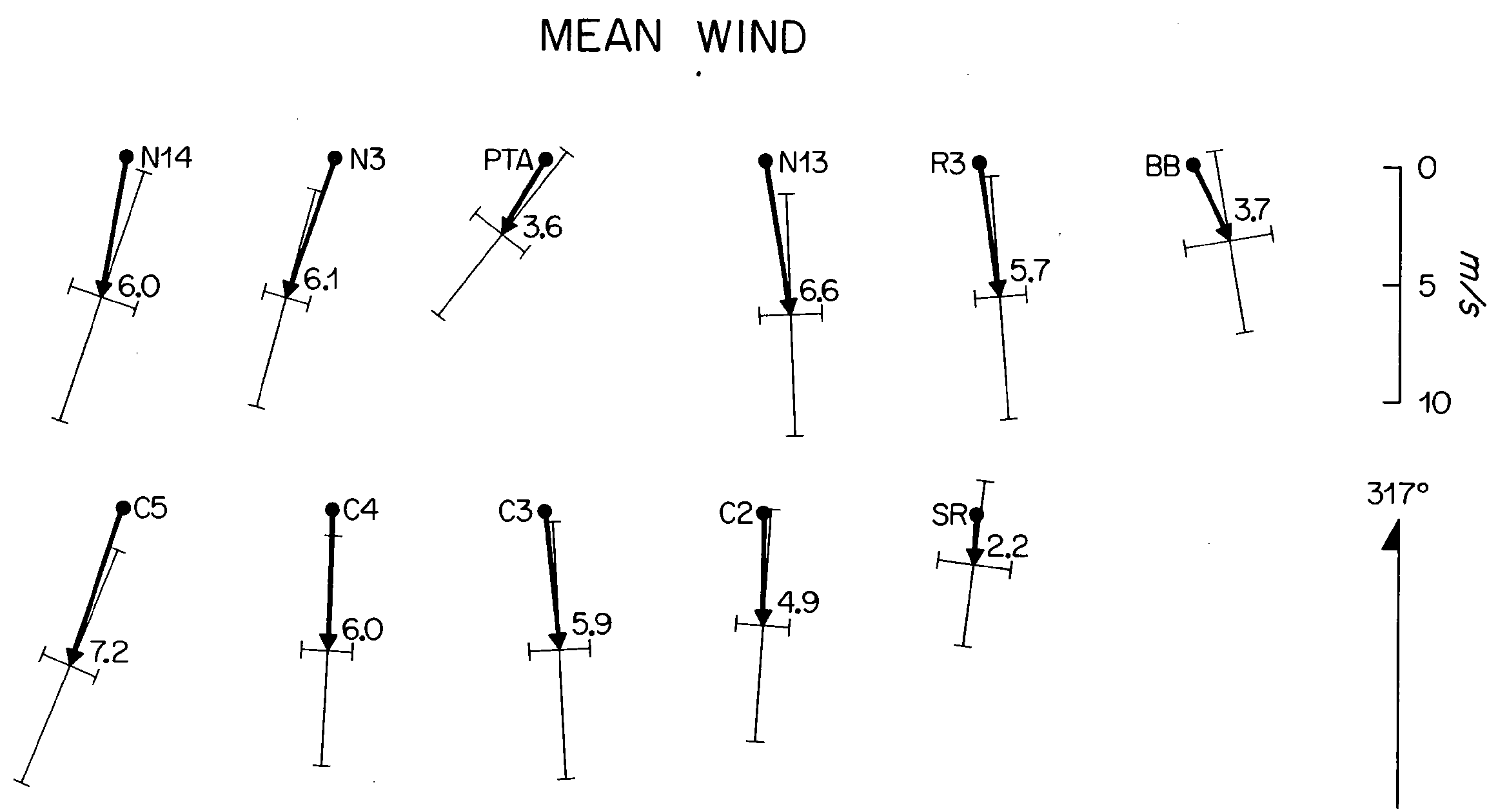


Figure 22. Mean observed wind in m/s. Bracket at tip of mean wind vector shows orientation of principal axes and standard deviations along principal axes.

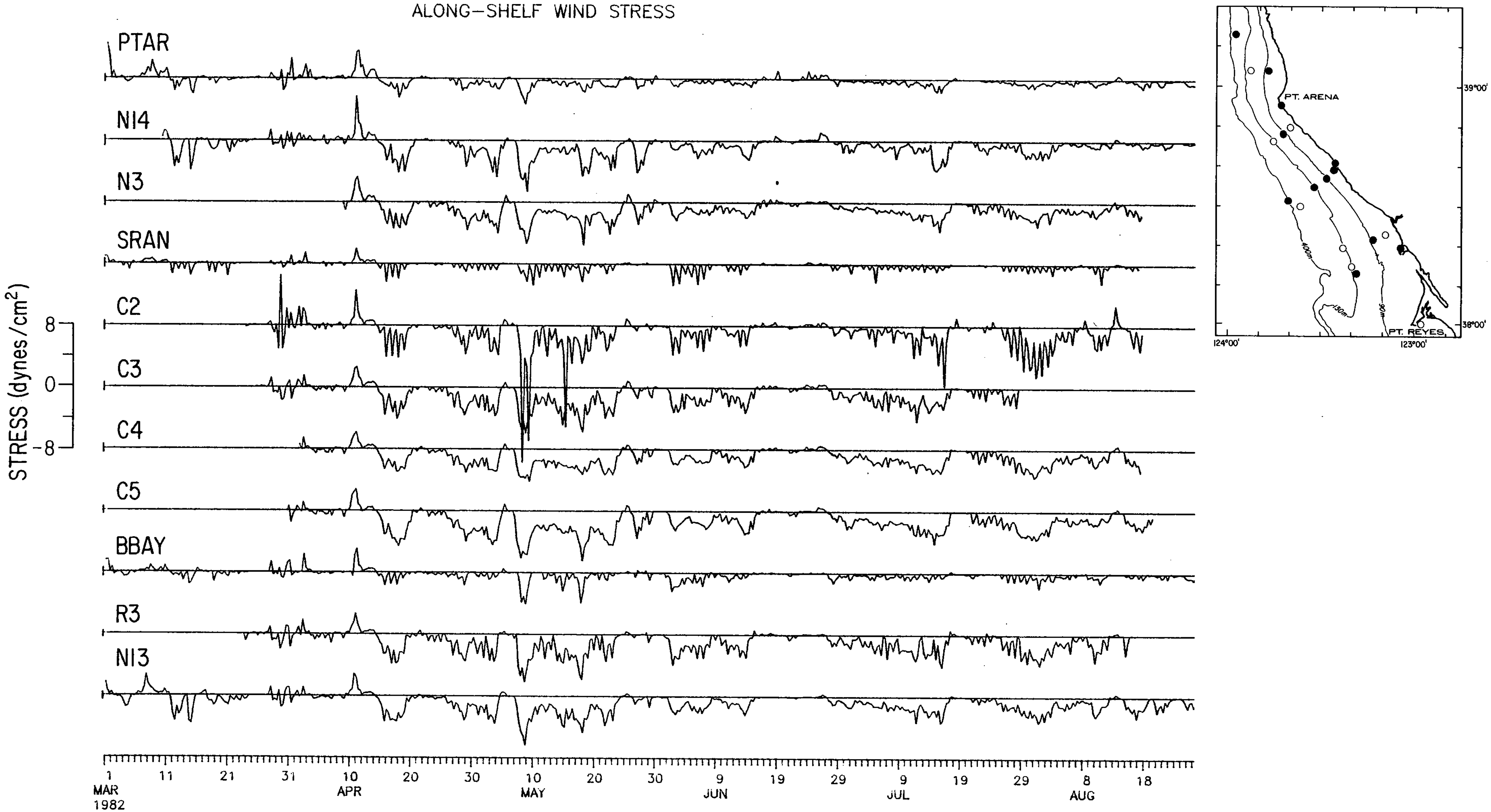

ALONG-SHELF WIND STRESS
PTAR
N14
N3
SRAN
C2
C3
C4
C5
BBAY
R3
N13
STRESS (dynes/cm²)
8
0
-8
1 MAR 1982
11
21
31
10 APR
20
30
10 MAY
20
30
9 JUN
19
29
9 JUL
19
29
8 AUG
18
PT. ARENA
PT. REYES
39°00'
38°00'
124°00'
123°00'

Figure 23

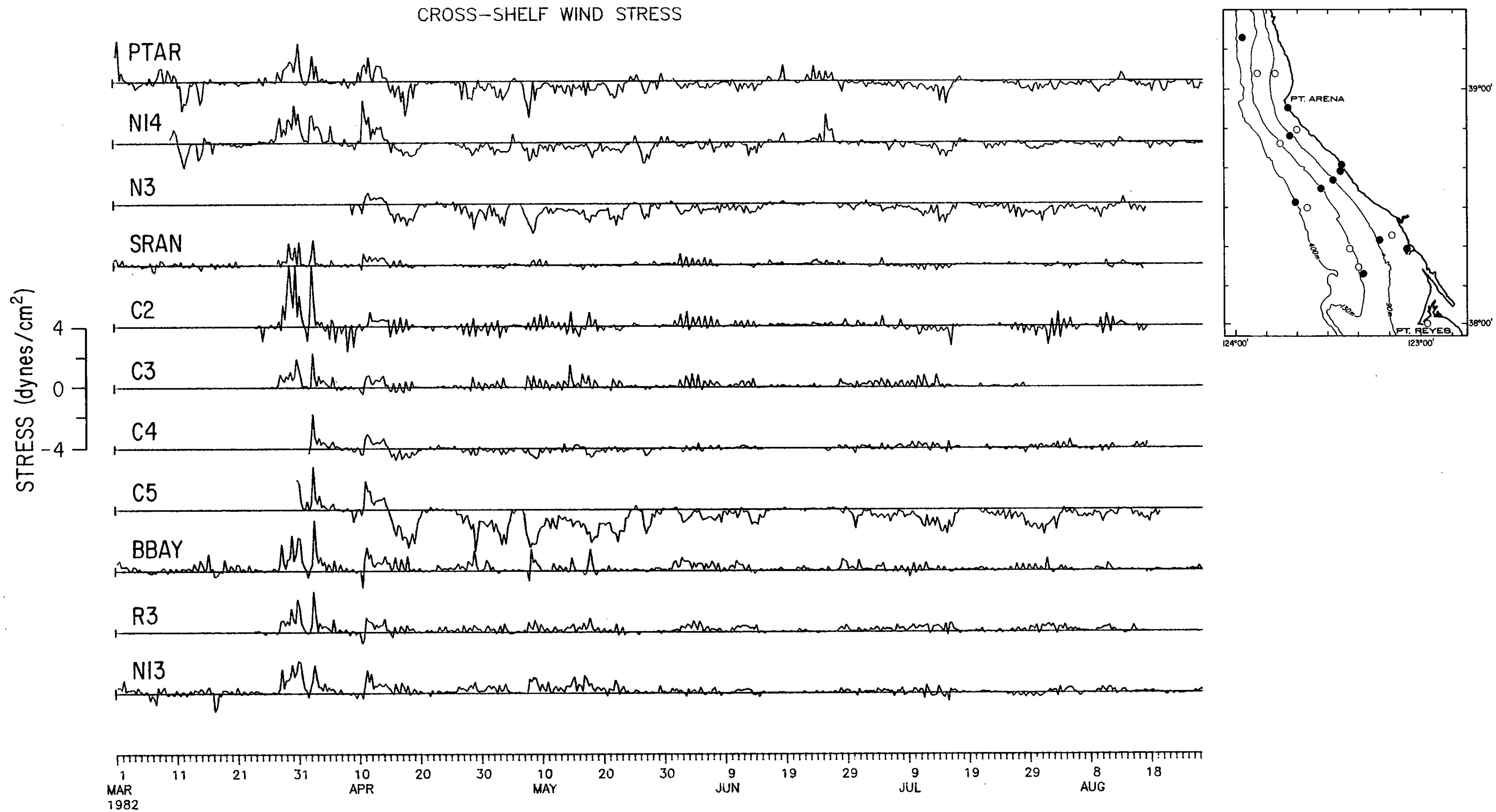

CROSS-SHELF WIND STRESS
PTAR
NI4
N3
SRAN
C2
C3
C4
C5
BBAY
R3
NI3
STRESS (dynes/cm²)
4
0
-4
1 MAR 1982
11
21
31
10 APR
20
30
10 MAY
20
30
9 JUN
19
29
9 JUL
19
29
8 AUG
18
PT. ARENA
PT. REYES
39°00'
38°00'
124°00'
123°00'
400m
130m
90m

Figure 24

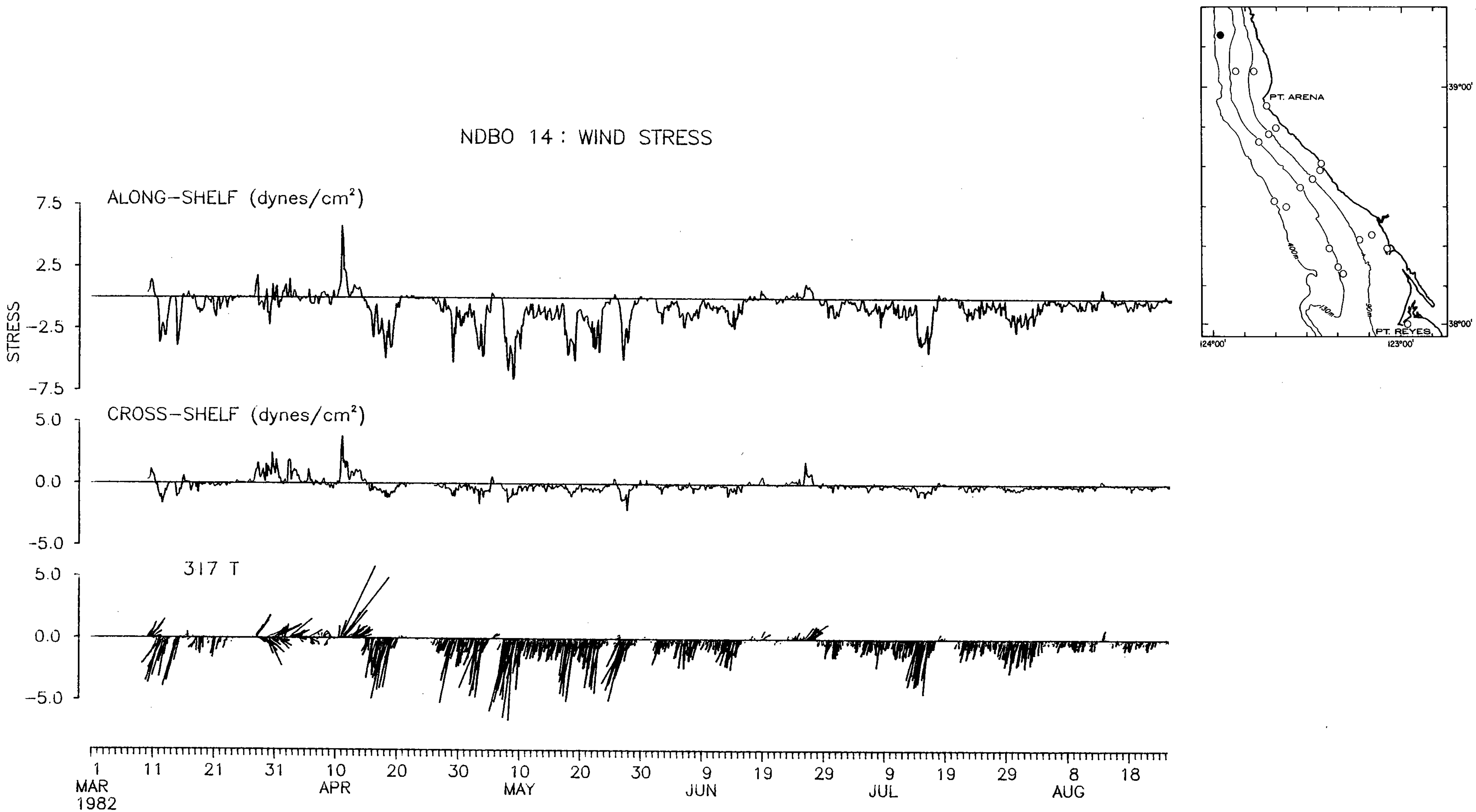

NDBO 14 : WIND STRESS
ALONG-SHELF (dynes/cm²)
7.5
2.5
-2.5
-7.5
STRESS
CROSS-SHELF (dynes/cm²)
5.0
0.0
-5.0
317 T
5.0
0.0
-5.0
1 MAR 1982
11
21
31
10 APR
20
30
10 MAY
20
30
9 JUN
19
29
9 JUL
19
29
8 AUG
18
PT. ARENA
PT. REYES
39°00'
38°00'
124°00'
123°00'
400m
130m
90m

Figure 25

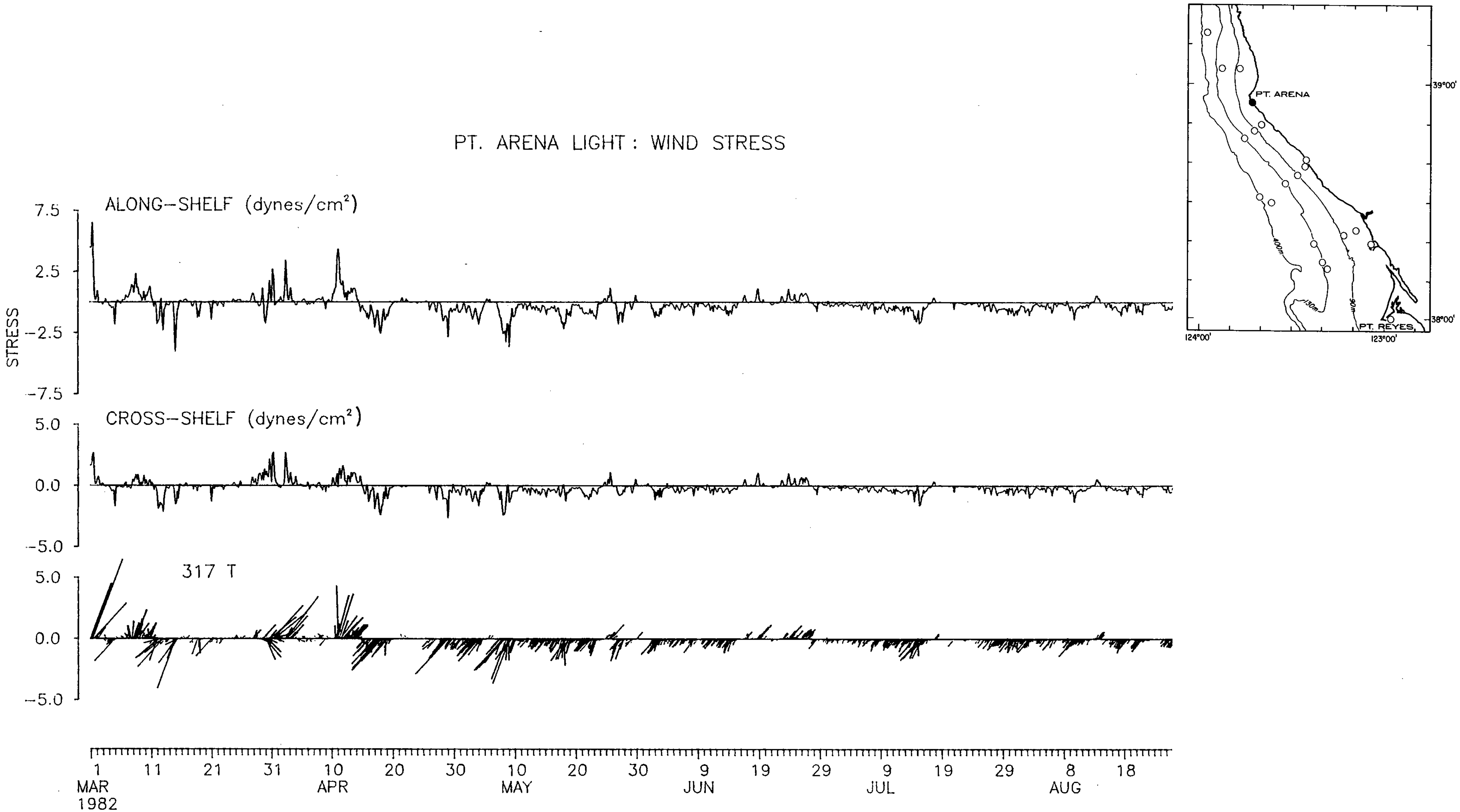

PT. ARENA LIGHT: WIND STRESS
ALONG-SHELF (dynes/cm²)
CROSS-SHELF (dynes/cm²)
317 T
STRESS
7.5
2.5
-2.5
-7.5
5.0
0.0
-5.0
1 MAR 1982
11
21
31
10 APR
20
30
10 MAY
20
30
9 JUN
19
29
9 JUL
19
29
8 AUG
18
PT. ARENA
PT. REYES
39°00'
38°00'
124°00'
123°00'
400m
130m
90m

Figure 26

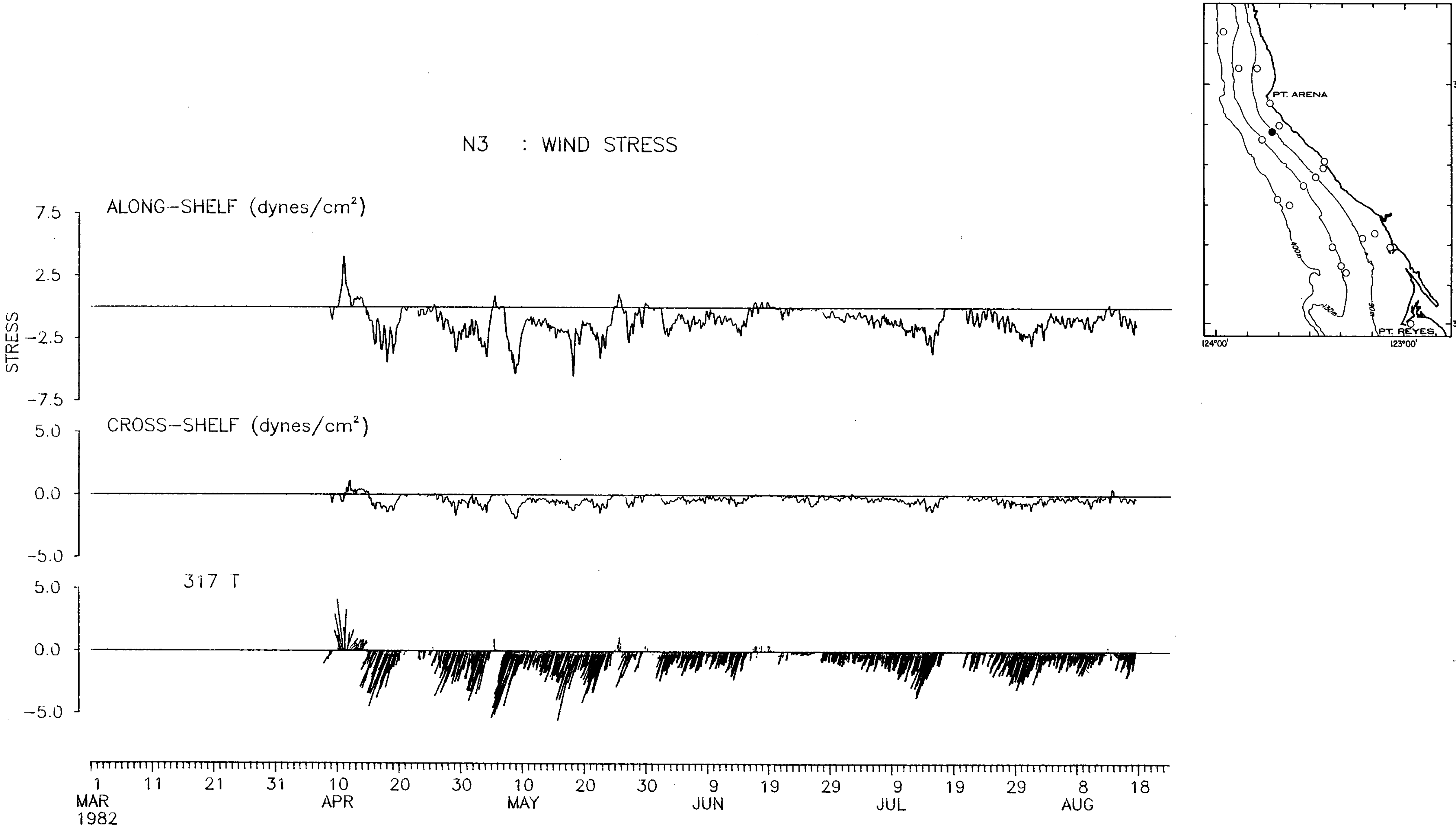
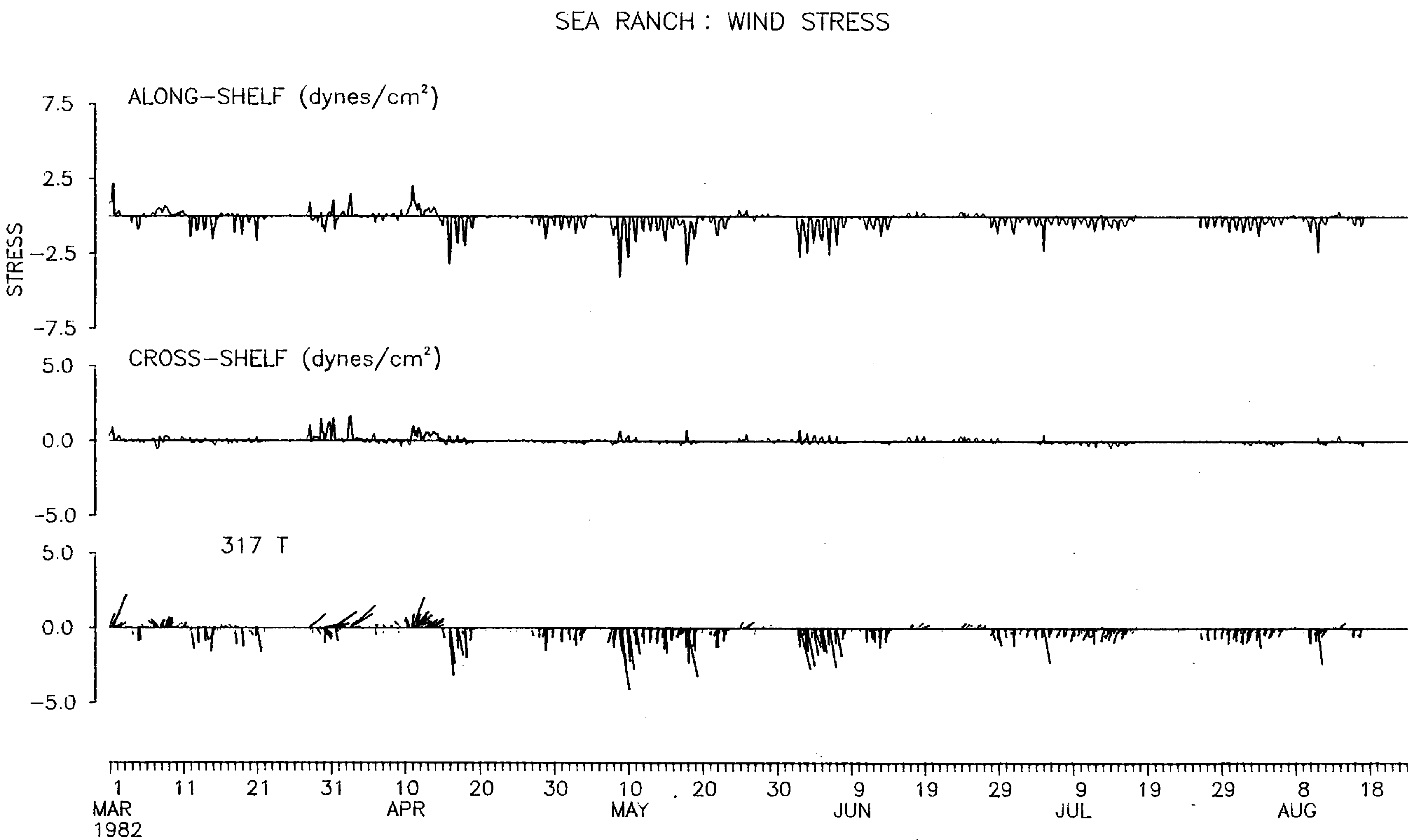

N3 : WIND STRESS
ALONG-SHELF (dynes/cm²)
CROSS-SHELF (dynes/cm²)
317 T
STRESS
7.5
2.5
-2.5
-7.5
5.0
0.0
-5.0
5.0
0.0
-5.0
1
MAR
1982
11
21
31
10
APR
20
30
10
MAY
20
30
9
JUN
19
29
9
JUL
19
29
8
AUG
18
PT. ARENA
PT. REYES
39°00'
38°00'
124°00'
123°00'
400m
130m
90m

Figure 27


SEA RANCH : WIND STRESS
ALONG-SHELF (dynes/cm²)
7.5
2.5
-2.5
-7.5
STRESS
CROSS-SHELF (dynes/cm²)
5.0
0.0
-5.0
317 T
5.0
0.0
-5.0
1
11
21
31
10
20
30
10
20
30
9
19
29
9
19
29
8
18
MAR
1982
APR
MAY
JUN
JUL
AUG

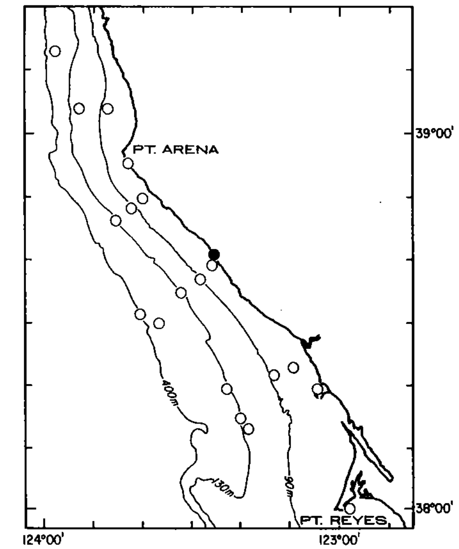
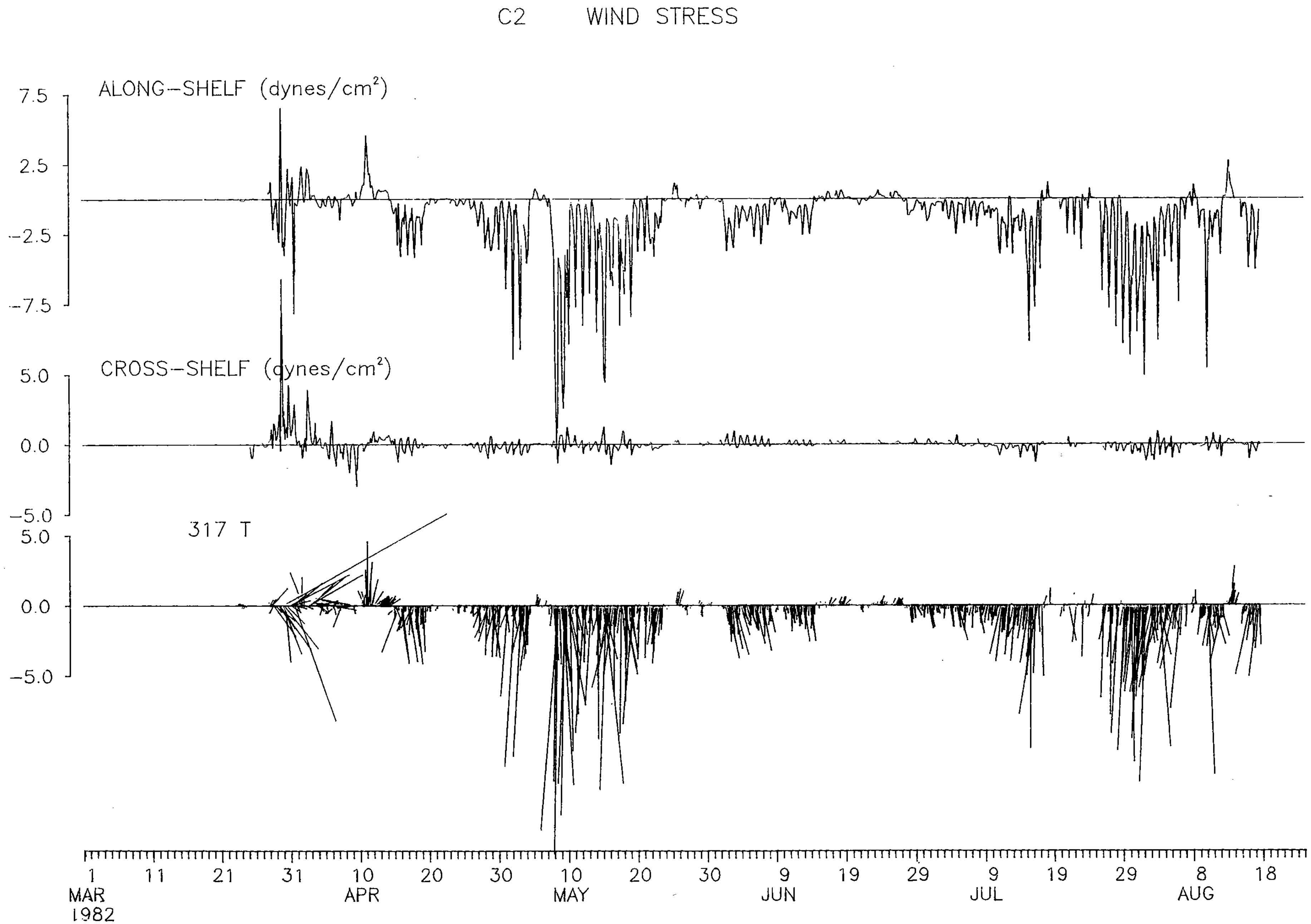

PT. ARENA
39°00'
38°00'
PT. REYES
124°00'
123°00'

Figure 28


C2 WIND STRESS
ALONG-SHELF (dynes/cm²)
7.5
2.5
-2.5
-7.5
CROSS-SHELF (dynes/cm²)
5.0
0.0
-5.0
317 T
5.0
0.0
-5.0
1 11 21 31 10 20 30 10 20 30 9 19 29 9 19 29 8 18
MAR
1982
APR
MAY
JUN
JUL
AUG

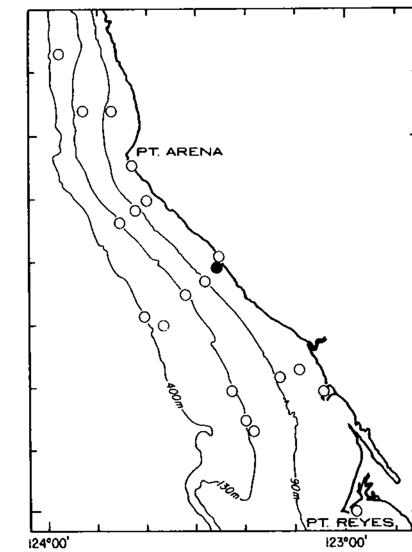
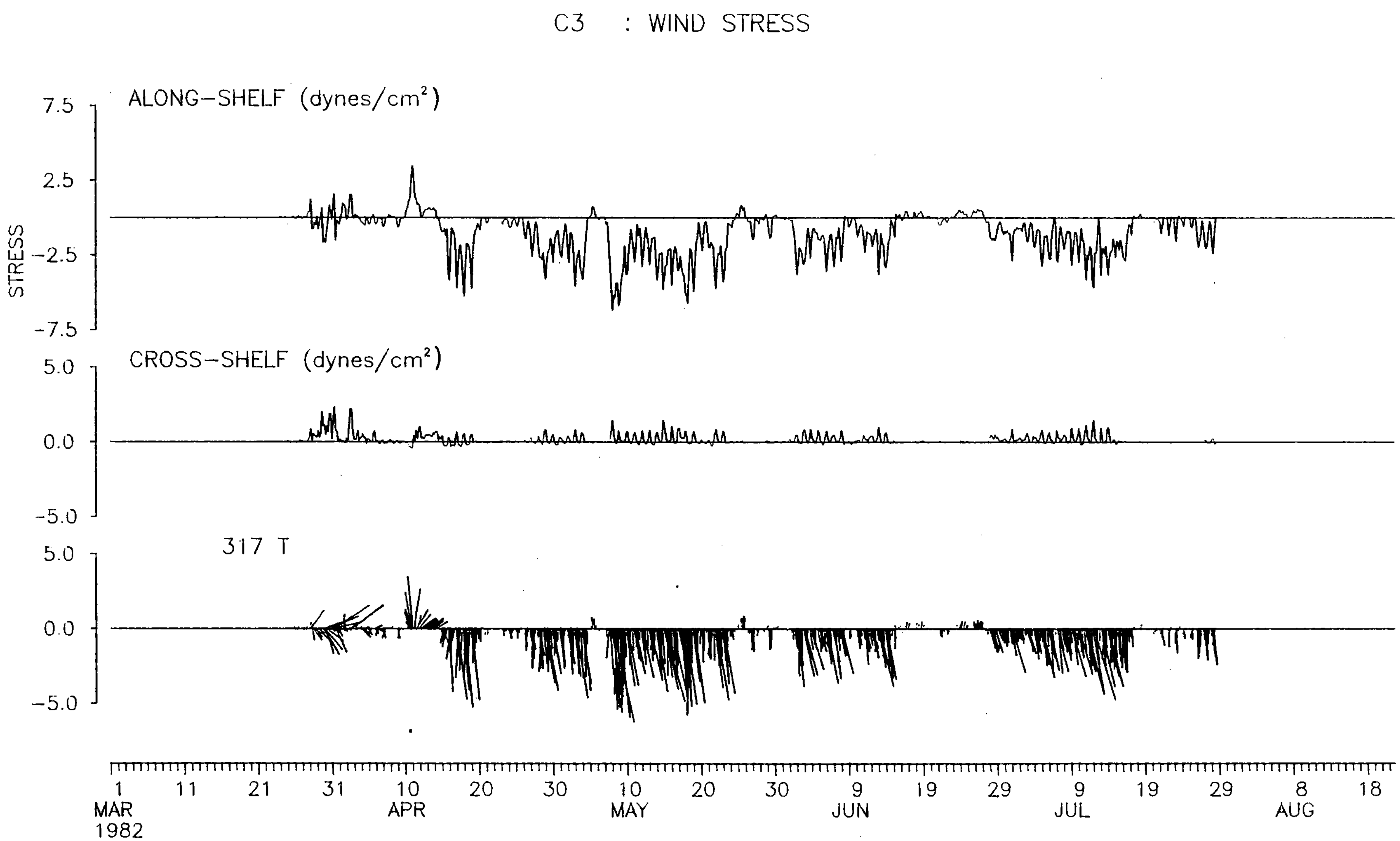

PT. ARENA
39°00'
400m
130m
90m
PT. REYES
38°00'
124°00'
123°00'

Figure 29


C3 : WIND STRESS
ALONG-SHELF (dynes/cm²)
7.5
2.5
-2.5
-7.5
STRESS
CROSS-SHELF (dynes/cm²)
5.0
0.0
-5.0
317 T
5.0
0.0
-5.0
1
MAR
1982
11
21
31
10
APR
20
30
10
MAY
20
30
9
JUN
19
29
9
JUL
19
29
8
AUG
18

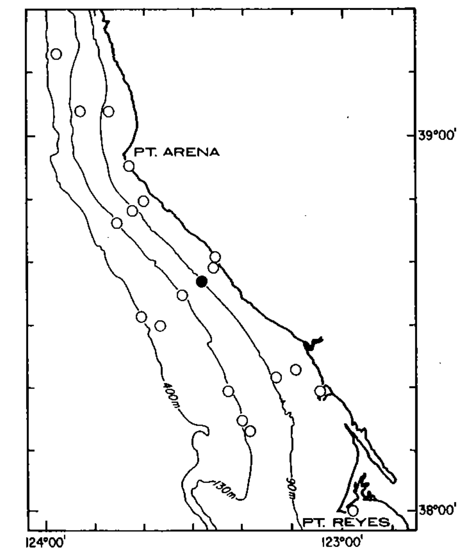
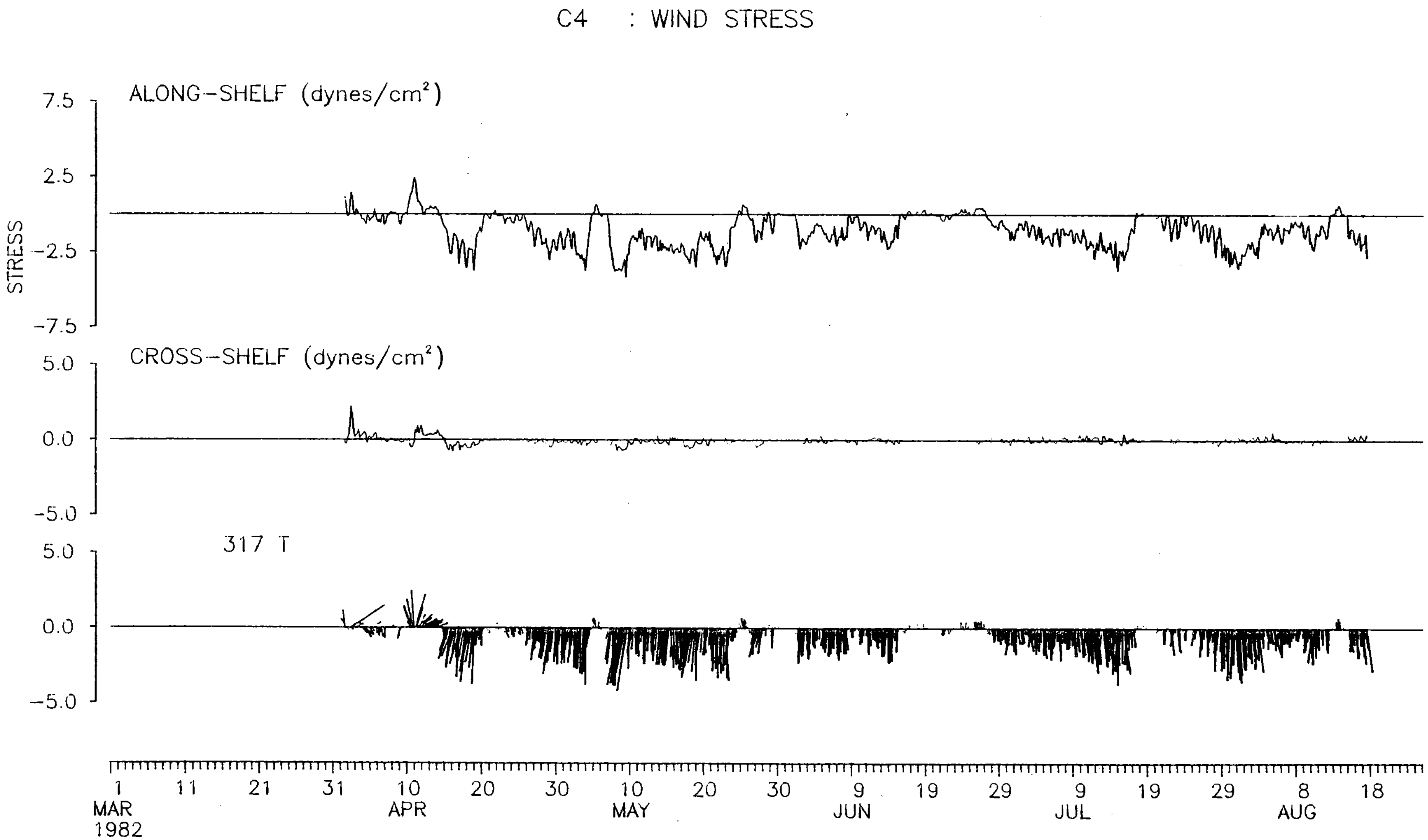

PT. ARENA
PT. REYES
39°00'
38°00'
124°00'
123°00'
400m
130m
90m

Figure 30


C4 : WIND STRESS
ALONG-SHELF (dynes/cm²)
7.5
2.5
-2.5
-7.5
STRESS
CROSS-SHELF (dynes/cm²)
5.0
0.0
-5.0
317 T
5.0
0.0
-5.0
1
11
21
31
10
20
30
10
20
30
9
19
29
9
19
29
8
18
MAR
1982
APR
MAY
JUN
JUL
AUG

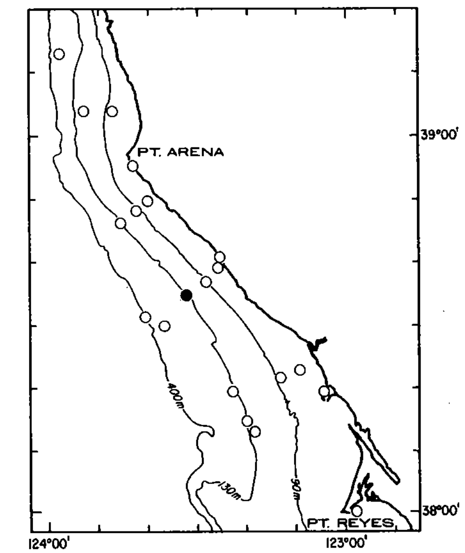
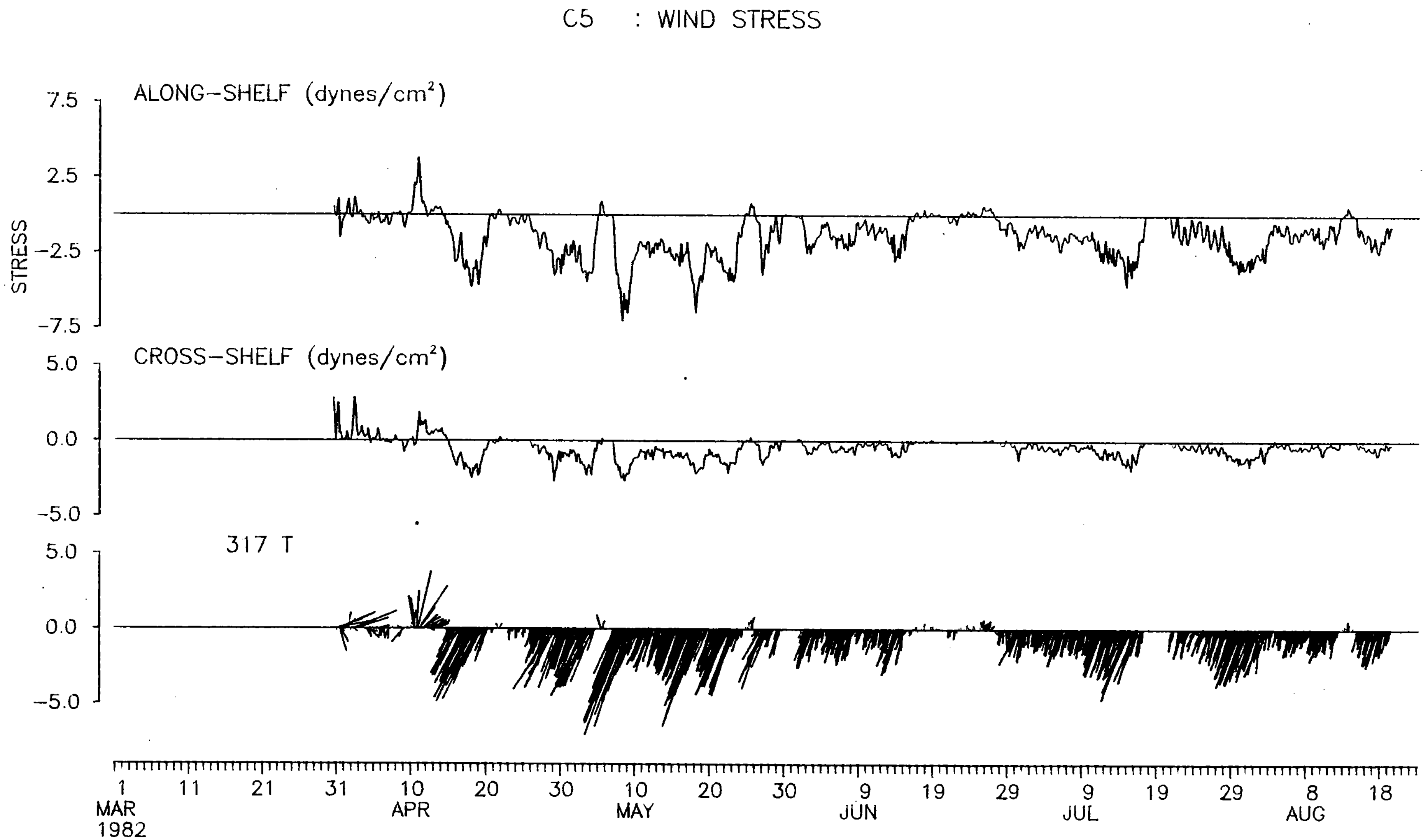

PT. ARENA
PT. REYES
39°00'
38°00'
124°00'
123°00'
400m
130m
90m

Figure 31


C5 : WIND STRESS
ALONG-SHELF (dynes/cm²)
7.5
2.5
-2.5
-7.5
STRESS
CROSS-SHELF (dynes/cm²)
5.0
0.0
-5.0
317 T
5.0
0.0
-5.0
1
MAR
1982
11
21
31
10
APR
20
30
10
MAY
20
30
9
JUN
19
29
9
JUL
19
29
8
AUG
18

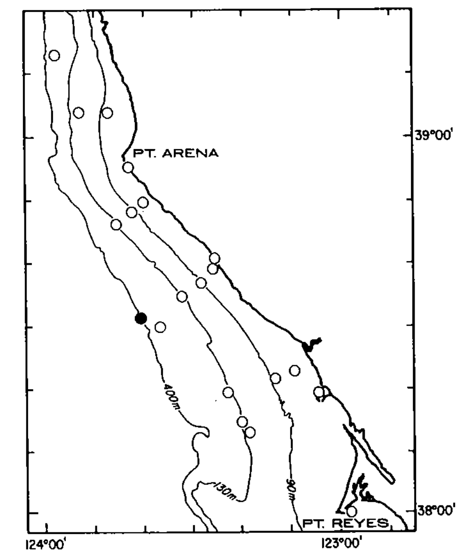
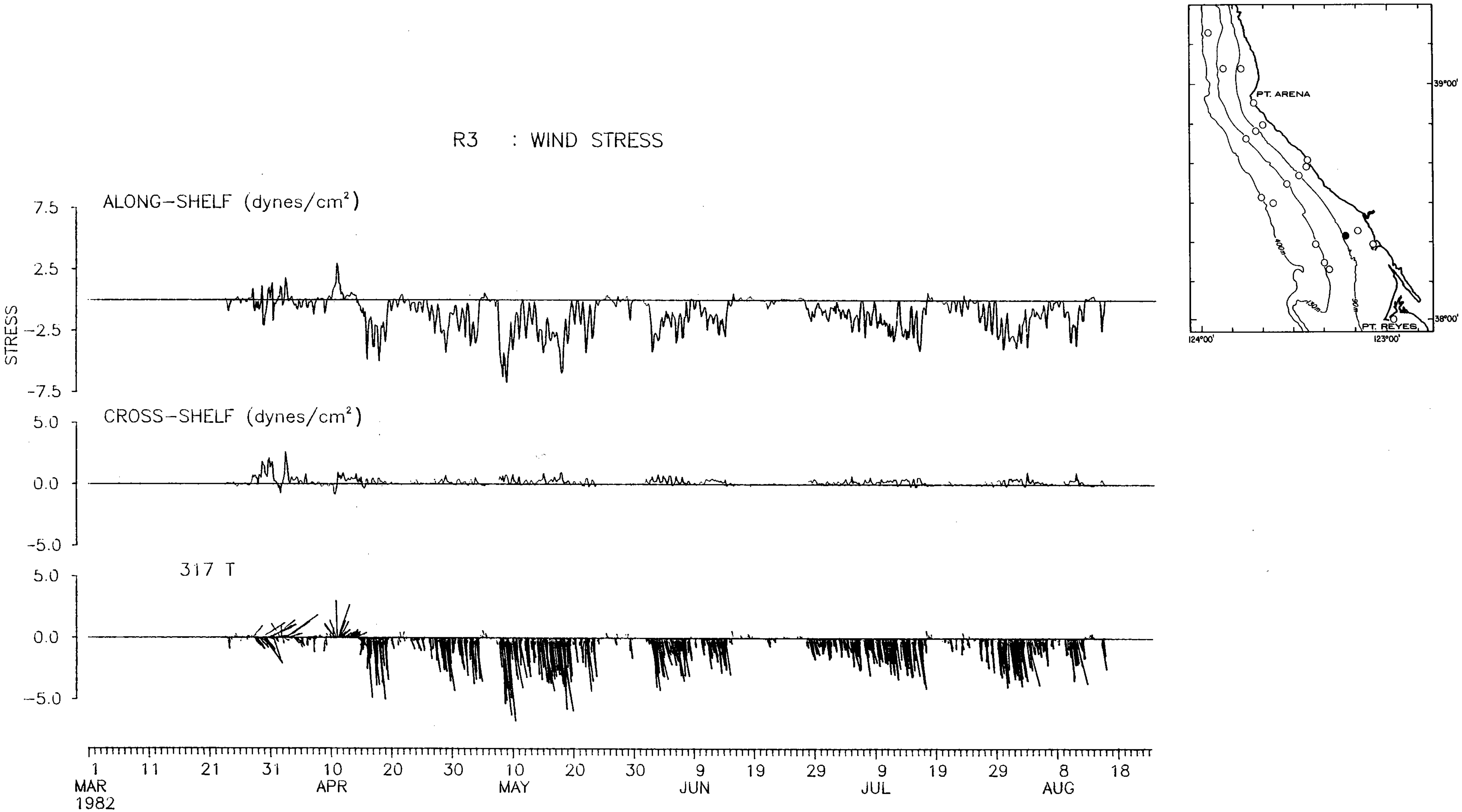

PT. ARENA
39°00'
38°00'
PT. REYES
124°00'
123°00'

Figure 32


R3 : WIND STRESS
ALONG-SHELF (dynes/cm²)
CROSS-SHELF (dynes/cm²)
317 T
STRESS
7.5
2.5
-2.5
-7.5
5.0
0.0
-5.0
1
11
21
31
10
20
30
10
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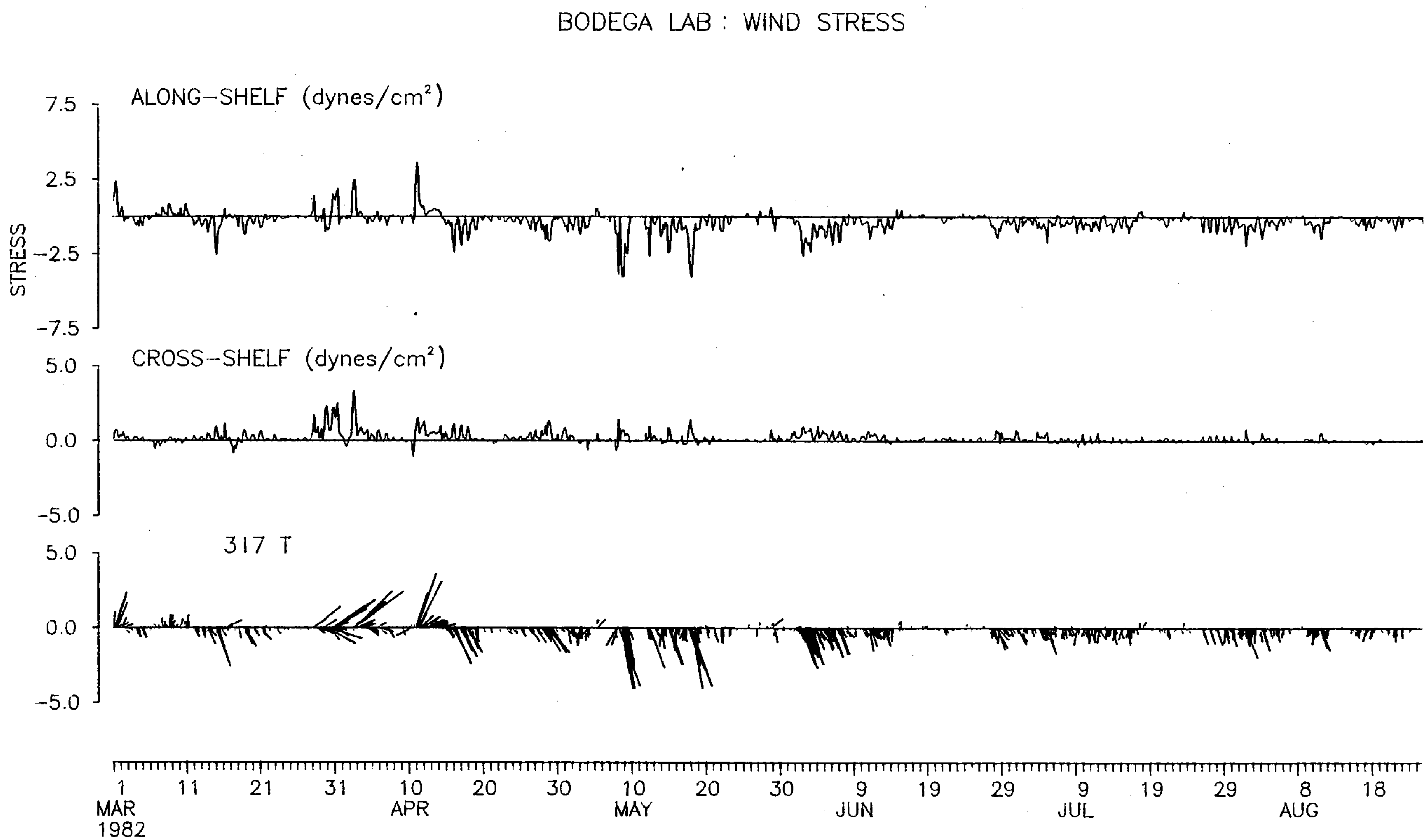
8
18
MAR
1982
APR
MAY
JUN
JUL
AUG
PT. ARENA
PT. REYES
400m
130m
90m
39°00'
38°00'
124°00'
123°00'

Figure 33


BODEGA LAB : WIND STRESS
ALONG-SHELF (dynes/cm²)
STRESS
7.5
2.5
-2.5
-7.5
CROSS-SHELF (dynes/cm²)
5.0
0.0
-5.0
317 T
5.0
0.0
-5.0
1
11
21
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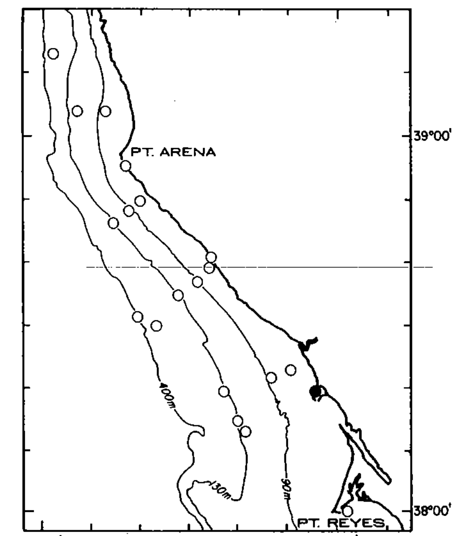
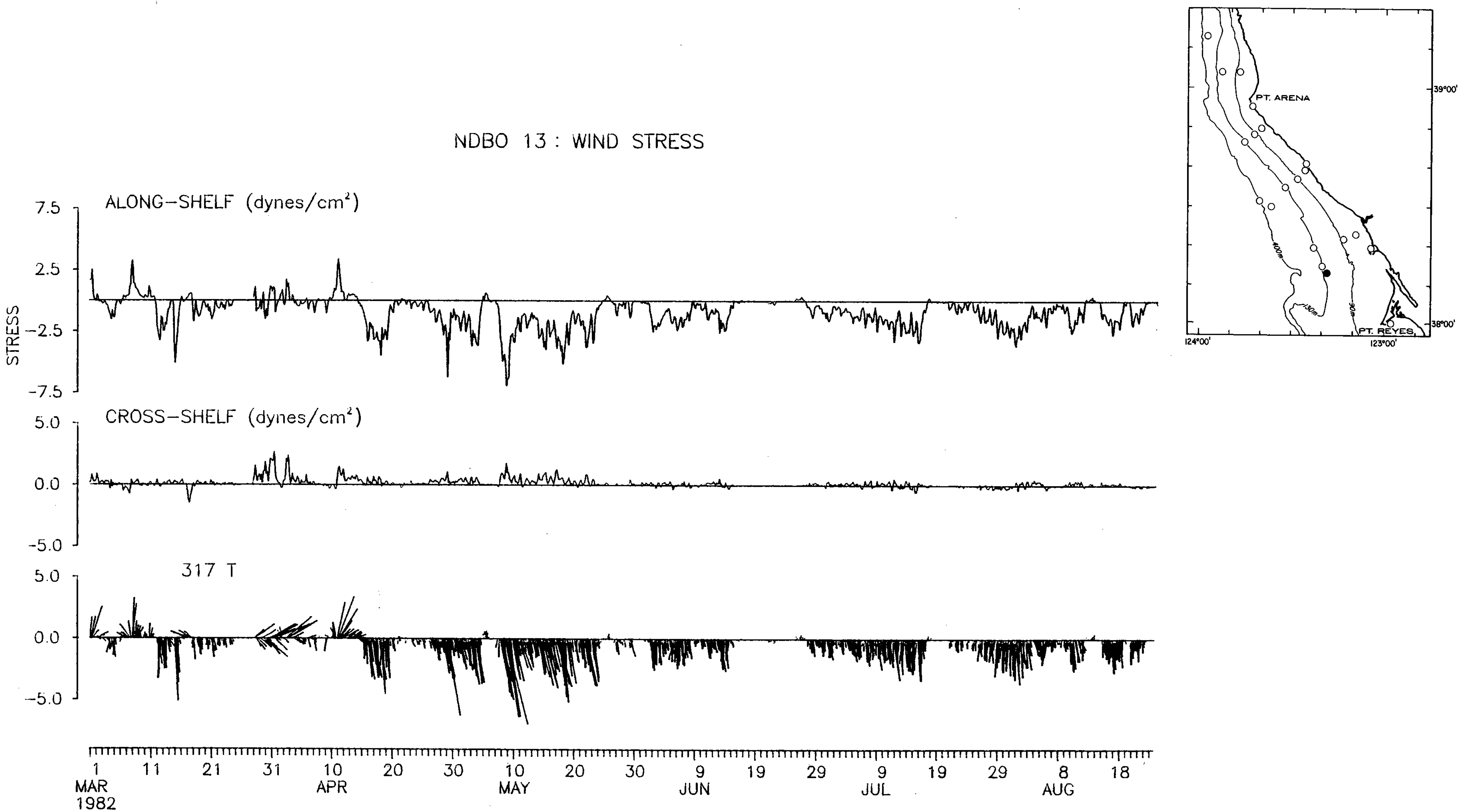

PT. ARENA
39°00'
38°00'
PT. REYES
124°00'
123°00'
400m
130m
90m

Figure 34


NDBO 13 : WIND STRESS
ALONG-SHELF (dynes/cm²)
CROSS-SHELF (dynes/cm²)
317 T
STRESS
7.5
2.5
-2.5
-7.5
5.0
0.0
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AUG
18
PT. ARENA
PT. REYES
39°00'
38°00'
124°00'
123°00'
400m
130m
90m

Figure 35

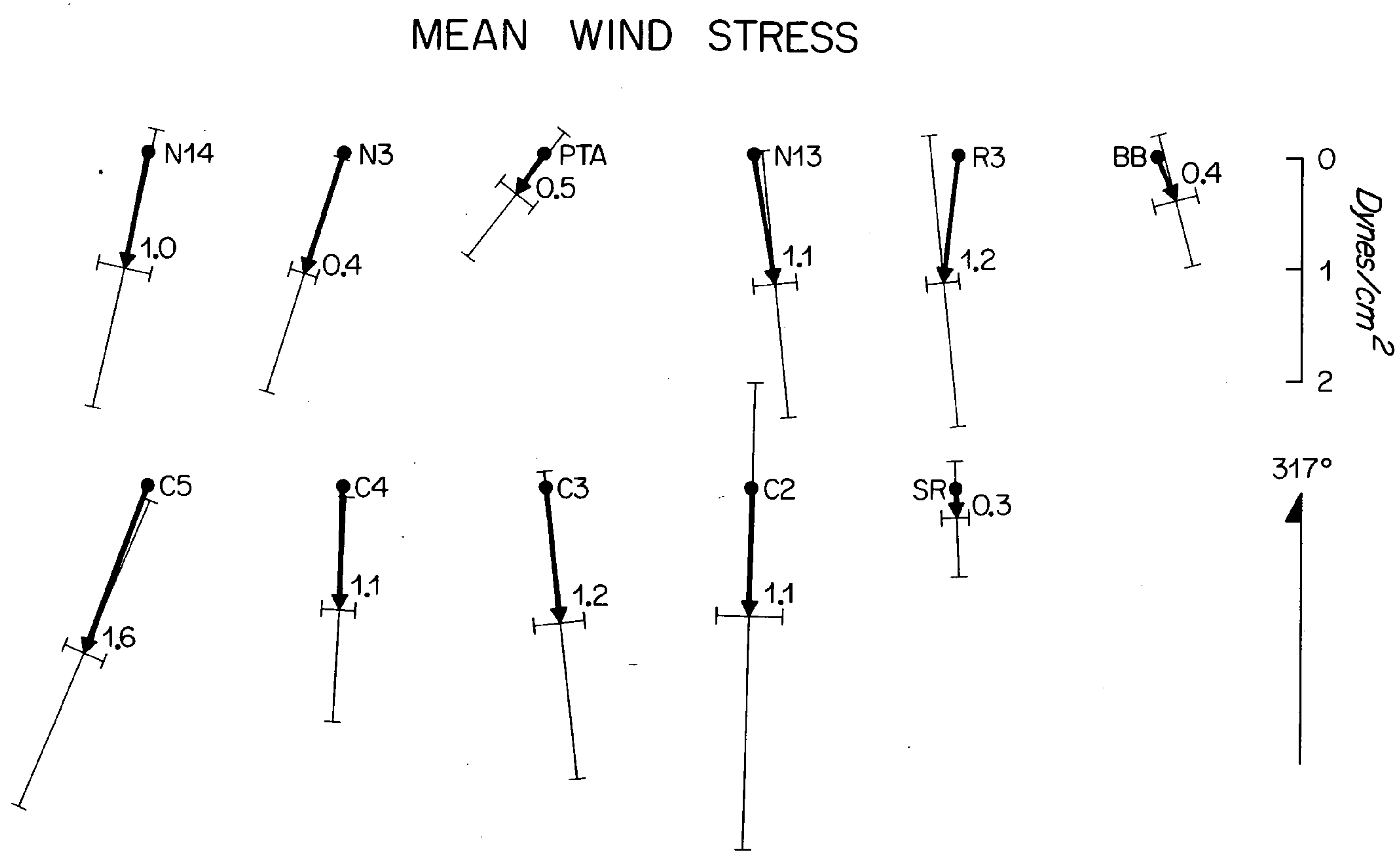

Figure 36. Mean wind stress in dyne/cm^2. Bracket at tip of mean vector shows orientation of principal axes and standard deviations along principal axes.

CODE-2: MOORED CURRENT OBSERVATIONS

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A. INTRODUCTION

The CODE-2 experiment was designed to establish the kinematic and dynamic balances which are responsible for the wind-driven flow on the Continental Shelf. The CODE-1 moored array focused primarily on the determination of scales of flow. Based on those results the CODE-2 array was designed to optimize our ability to describe the forcing and the response as well as to define the different spectral structure which characterize the wind-driven flow.

The time frame described here spans the period 1 March 1982 to 31 August 1982. The experimental site is centered on the northern California Continental Shelf about 100 km northwest of San Francisco Bay. A map of the array site and mooring locations is shown in Figure 1. The exact mooring locations are given in Table 2 of the introductory chapter.

Time series of horizontal current components are plotted over the period of interest. Individual data values correspond to hour-long averages (computed using a running mean filter) that are centered on the hour. Horizontal velocity components are referenced to a right-hand coordinate system which has the positive x axis directed towards 47° T (30° M) (approximately normal to local isobaths) and the positive y axis directed towards 317° T (parallel to local isobaths).

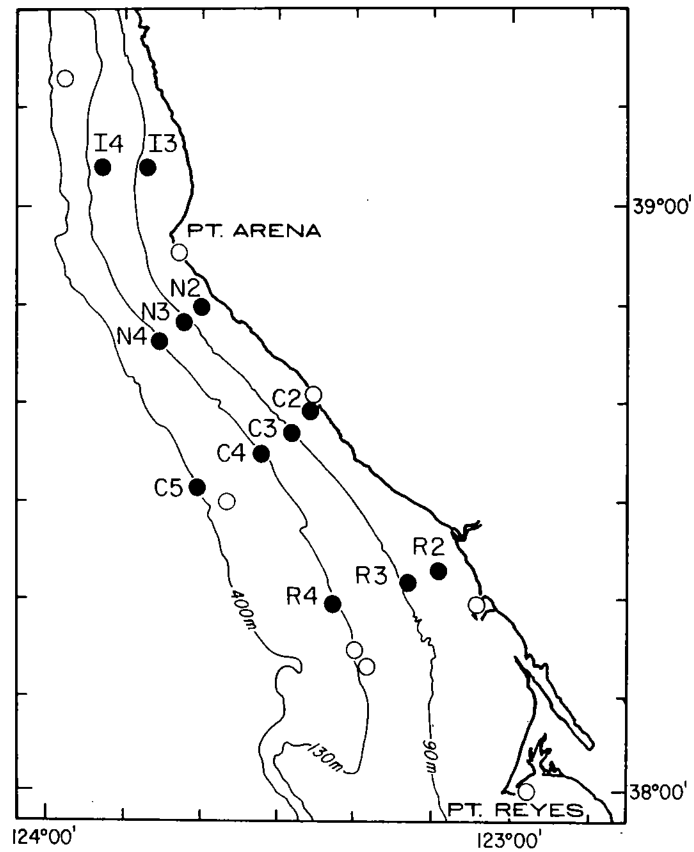

Figure 1. Map of the CODE-2 array site and current meter mooring locations.

B. MOORED CURRENT METER OBSERVATIONS

B.1 Moored Array Design

The current meter placement for the CODE-2 experiment was primarily determined by the following considerations. The shelf region south of Pt. Arena was selected due to the nearly planar bottom topography (on spatial scales of 2-20 km), and the presence of energetic upwelling-favorable winds during spring and early summer. The vertical spacing interval for instruments [O(10 m)] was chosen to insure that adjacent instruments were coherent with each other at subinertial frequencies and that relatively accurate vertically averaged quantities could be inferred at each mooring site, based on the results of CODE-1. In the horizontal, the moorings were deployed so as to form a rough control volume (moorings N2-N4, C2-C4 and R2-R4) supplemented by two moorings (I3 and I4) north of Pt. Arena and a mooring (C5) in 400 m depth, on the continental slope.

B.2 Instrumentation

With only a few exceptions, the Vector Measuring Current Meter (VMCM) was selected to measure currents during this experiment. Although slightly different variations of this instrument were used by the different groups involved in the current observations, they all conform to the specifications detailed in the CODE-1 data report (WHOI Technical Report 83-23).

B.3 Data Presentation

The moored current meter data presented here are grouped according to mooring location. The elementary statistics associated with the complete time series of hourly average current component data are first presented in tabular form in Table 1, and then the individual time series are displayed as plots. Hour-long averages are formed using a running mean filter which is centered on the hour. The following statistics are presented for each time series:

Mean, $$\bar{x} = \frac{1}{N} \sum_{j=1}^{N} x_j$$

Std Deviation, $$SD = \left[\frac{1}{N-1} \sum_{J=1}^{N} (x_j - \bar{x})^2 \right]^{1/2}$$

Minimum and maximum values for each time series are also presented. Cross-shelf current (U) is positive when directed toward 47°T (onshore). Along-shelf current (V) is positive when directed toward 317°T. Note that approximate instrument depth is also given in the following tables. All times have been converted to GMT. Table 2 shows similar statistics for the 2491 hour time interval starting 0800 3 April 1982 (GMT). All current time series that do not span this period have been omitted from this table.

Acknowledgments

R. C. Beardsley, R. E. Davis and C. D. Winant are the CODE principal investigators responsible for the design and execution of the moored current meters program. The engineering and technical support required was extensive and a number of individuals made substantial contributions to the project. The participation of M. Clifton, J. Dufour, P. Harvey, W. Powell, M. Kirk, S. Lentz, R. Lowe, G. Parks, S. Wald (all from SIO); K. Bradley, A. Ciesluk, P. Clay, J. Dean, R. La Rochelle, R. Limeburner, C. Mills, P. O'Malley, W. Ostrum, J. Poirier, J. Reese, L. Rosenfeld, S. Simkins, D. Simoneau, B. Skelly, and S. Worrilow, (all from WHOI), is greatly appreciated and contributed to the overall success of the field observation program. This work was supported by a grant from the Ocean Sciences Division of the National Science Foundation.

References

Rosenfeld, L. K., Editor, 1983. CODE-1: Moored Array and Large-Scale Data Report. Woods Hole Oceanographic Institution Technical Report No. 83-23, CODE Technical Report No. 21, 185 pp.

TABLE 1: Horizontal Current Components (cm/s): Complete Times Series for All Instruments

							Cross-Shelf				Along-Shelf			
Station	Water Depth (m)	Start Time (Mon/Day/Hr)	Stop Time (Mon/Day/Hr)	Duration (Days)	Instrument I.D.	Sensor Depth (m)	Mean	SD	Max	Min	Mean	SD	Max	Min
I3	90	03/19/2200	08/11/1100	144	04 (SIO)	10	-14.48	23.02	62.20	-86.30	-10.73	19.22	48.80	-72.40
		03/11/0100	08/05/0000	147	58 (SIO)	20	-7.13	16.73	40.60	-53.20	-9.28	16.99	37.50	-64.10
		03/10/1900	08/11/1100	153	01 (SIO)	53	-0.70	11.89	30.60	-41.60	-3.51	11.30	28.30	-51.10
I4	130	03/10/1600	08/11/1100	153	09 (SIO)	10	-17.44	20.51	46.20	-85.10	-12.57	17.88	43.90	-76.20
		03/11/0100	08/05/0000	147	59 (SIO)	20	-9.20	15.83	34.50	-58.30	-10.74	15.45	31.70	-64.80
		03/10/1600	08/11/1100	153	03 (SIO)	53	-1.64	11.78	32.60	-38.10	-4.33	12.63	31.30	-51.40
N2	60	03/11/0100	08/05/0000	147	65 (SIO)	10	-2.20	6.95	26.60	-24.40	-3.14	25.64	92.10	-69.30
		03/10/2200	08/10/1700	152	13 (SIO)	20	1.85	5.29	28.30	-22.40	-0.29	24.39	81.30	-66.80
		03/12/0100	08/05/0000	146	62 (SIO)	35	1.38	4.47	17.80	-16.50	0.97	15.89	61.40	-51.60
N3	90	03/10/2200	08/10/1700	152	11 (SIO)	10	-3.98	10.50	39.85	-42.50	-7.96	27.43	81.60	-108.90
		03/12/0100	08/05/0000	146	68 (SIO)	35	2.50	5.89	30.50	-24.50	-0.88	19.61	60.20	-73.30
		03/11/1300	08/10/1400	152	08 (SIO)	53	2.03	5.05	23.00	-25.40	1.79	16.40	45.10	-50.00
		03/12/0100	08/05/0000	146	64 (SIO)	70	0.64	6.17	23.60	-21.90	-3.13	14.51	45.00	-41.80
		03/11/1300	08/10/1400	152	15 (SIO)	83	-0.61	8.36	29.70	-40.00	3.36	13.77	43.40	-47.20
N4	130	03/24/0452	08/20/0352	149	B1 (WHOI)	10	-3.98	14.86	52.70	-57.30	-12.09	23.84	43.70	-97.60
		03/24/0500	08/20/0400	149	B2 (WHOI)	20	1.30	10.59	41.90	-41.80	-8.92	21.17	39.40	-81.60
		03/25/0500	08/20/0400	148	S1 (WHOI)	35	1.86	9.98	35.00	-40.80	-6.40	18.79	37.20	-77.30
		03/25/0500	08/20/0400	148	S2 (WHOI)	55	2.93	7.59	38.50	-26.20	-2.17	17.37	36.20	-72.60
		03/25/0500	08/20/0400	148	S3 (WHOI)	70	2.19	6.87	22.50	-28.00	1.18	16.02	37.10	-64.70
		03/25/0500	08/20/0400	148	S4 (WHOI)	90	2.26	6.24	22.80	-30.60	3.91	15.11	40.90	-63.70
		03/25/0500	08/20/0400	148	S5 (WHOI)	110	1.57	6.03	26.40	-19.50	5.57	14.70	38.10	-59.60
		03/25/0452	08/20/0352	148	S6 (WHOI)	121	0.99	6.44	30.50	-20.30	6.56	14.62	37.40	-44.50
C2	60	03/12/0100	08/05/0000	146	56 (SIO)	10	-1.33	6.06	25.60	-24.40	2.76	18.75	74.50	-55.40
		03/11/2200	08/13/1400	154	02 (SIO)	20	2.61	6.50	29.50	-25.50	4.40	19.59	64.60	-64.90
		03/12/0100	08/05/0000	146	51 (SIO)	35	1.21	4.44	23.90	-14.30	3.38	12.50	41.90	-45.90
		03/12/0100	08/05/0000	146	61 (SIO)	53	-0.21	4.74	15.10	-33.70	2.00	8.56	32.80	-37.90

TABLE 1: Horizontal Current Components (cm/s) (Continued)

Station	Water Depth (m)	Start Time (Mon/Day/Hr)	Stop Time (Mon/Day/Hr)	Duration (Days)	Instrument I.D.	Sensor Depth (m)	Cross-Shelf				Along-Shelf			
							Mean	SD	Max	Min	Mean	SD	Max	Min
C3	90	03/24/0500	07/28/0400	126	B3 (WHOI)	5	-5.51	12.18	45.90	-59.40	-6.03	25.89	93.70	-86.30
		03/24/0500	07/28/0400	126	B4 (WHOI)	10	-4.07	11.04	40.10	-50.70	-3.62	25.01	77.20	-91.00
		03/12/0100	08/05/0000	146	53 (SIO)	10	-3.95	10.64	39.70	-48.00	-7.16	24.66	77.50	-94.60
		03/24/0500	08/28/0400	126	B5 (WHOI)	15	-3.33	9.44	30.90	-47.90	-4.19	22.76	57.40	-81.60
		03/11/1900	08/09/0500	150	06 (SIO)	20	-1.42	9.06	27.50	-47.00	-4.68	23.22	56.60	-83.60
		03/12/0100	08/05/0000	146	69 (SIO)	35	0.52	5.87	23.60	-35.20	-1.61	16.64	39.40	-69.00
		03/11/1900	08/09/0200	150	12 (SIO)	53	0.77	5.08	21.30	-24.20	-0.04	14.59	34.60	-58.10
		03/12/0100	08/05/0000	146	67 (SIO)	70	0.22	4.77	20.50	-27.30	1.13	13.08	33.40	-50.10
		03/11/1900	08/09/0200	150	14 (SIO)	83	0.05	4.72	18.70	-27.50	0.78	10.93	29.70	-36.20
C4	130	04/01/0500	08/17/0400	138	B2 (WHOI)	10	-7.95	14.58	43.70	-55.30	-20.48	22.94	36.40	-90.70
		04/01/0500	08/17/0400	138	B3 (WHOI)	20	-3.95	10.05	31.70	-45.30	-15.77	19.51	33.20	-82.40
		04/01/0500	08/17/0400	138	S1 (WHOI)	35	-2.09	8.14	30.50	-34.30	-10.84	15.43	29.80	-71.10
		04/01/0500	08/17/0400	138	S2 (WHOI)	55	0.29	6.83	26.10	-36.70	-6.84	13.24	25.60	-60.50
		04/01/0500	08/17/0400	138	S3 (WHOI)	70	0.76	6.66	27.40	-39.00	-4.38	12.27	26.90	-62.10
		04/01/0500	08/17/0400	138	S4 (WHOI)	90	0.60	6.13	20.60	-42.90	-1.44	11.46	37.00	-59.50
		04/01/0452	06/16/2252	76	S5 (WHOI)	110	-0.07	6.62	18.40	-32.90	-1.04	11.81	32.40	-42.00
		04/01/0500	08/17/0400	138	S6 (WHOI)	121	0.19	6.27	21.00	-28.80	1.71	11.25	35.20	-41.50
C5	400	03/30/0500	08/19/0400	142	B3 (WHOI)	20	-0.86	13.91	43.70	-58.90	-12.61	20.14	41.70	-73.00
		03/30/0456	08/19/0356	142	B4 (WHOI)	35	1.71	12.31	41.30	-55.60	-9.61	17.03	33.40	-60.80
		03/30/0500	08/19/0400	142	B5 (WHOI)	55	3.76	10.41	39.90	-44.00	-5.90	14.54	30.50	-54.20
		03/30/0500	08/19/0400	142	S1 (WHOI)	70	4.02	9.56	47.20	-30.90	-2.81	14.02	37.40	-50.20
		03/30/0500	08/19/0400	142	S2 (WHOI)	90	3.44	7.98	30.70	-21.60	-0.69	12.06	33.30	-43.80
		03/30/0500	08/19/0400	142	S3 (WHOI)	110	4.70	8.63	31.70	-21.20	-2.74	12.24	38.00	-38.10
		03/30/0452	08/19/0352	142	S4 (WHOI)	150	4.24	7.33	28.90	-22.10	-7.51	13.25	42.10	-36.90
		03/30/0500	08/19/0400	142	S5 (WHOI)	250	4.45	5.61	21.10	-16.40	12.10	11.96	41.30	-23.00
		03/30/0452	08/19/0352	142	S6 (WHOI)	350	2.96	5.18	20.30	-16.10	6.95	7.71	31.70	-25.00
R2	60	03/12/1300	08/10/0200	150	10 (SIO)	20	1.46	5.02	19.50	-26.40	6.91	13.54	59.90	-47.50
		03/13/0100	08/05/0000	145	50 (SIO)	35	1.46	3.88	19.90	-21.30	5.96	10.48	61.80	-30.90
		03/13/0100	08/05/0000	145	66 (SIO)	53	0.14	4.49	20.50	-23.90	3.14	7.01	45.40	-39.70

TABLE 1: Horizontal Current Components (cm/s) (Continued)

Station	Water Depth (m)	Start Time (Mon/Day/Hr)	Stop Time (Mon/Day/Hr)	Duration (Days)	Instrument I.D.	Sensor Depth (m)	Cross-Shelf Mean	Cross-Shelf SD	Cross-Shelf Max	Cross-Shelf Min	Along-Shelf Mean	Along-Shelf SD	Along-Shelf Max	Along-Shelf Min
R3	90	03/13/0100	04/25/2300	43	60 (SIO)	10	-3.36	8.50	29.10	-44.00	-1.21	14.84	62.10	-67.30
		06/28/0000	08/05/0000	38										
		03/12/1600	08/14/0800	154	07 (SIO)	20	-0.20	8.33	28.60	-32.20	0.40	17.04	56.00	-72.00
		03/13/0100	08/05/0000	145	54 (SIO)	35	0.85	5.00	21.70	-24.00	0.58	13.26	33.80	-56.90
		03/12/1900	08/14/1100	154	05 (SIO)	53	0.89	4.36	23.20	-19.50	1.58	11.76	38.10	-52.00
		03/13/0100	08/05/0000	145	55 (SIO)	70	0.75	4.24	23.00	-30.00	1.74	11.45	41.00	-48.50
R4	130	04/02/0452	08/18/0400	138	B1 (WHOI)	10	-16.07	19.72	44.80	-78.60	-22.21	21.10	33.80	-86.90
		03/02/0452	08/18/0400	138	B2 (WHOI)	20	-9.03	14.93	32.70	-66.60	-17.61	18.06	30.80	-75.30
		03/26/0500	08/14/0400	141	S1 (WHOI)	35	-5.92	12.33	31.90	-56.10	-13.25	14.50	24.60	-63.90
		03/26/0500	08/14/0400	141	S2 (WHOI)	55	-3.00	9.66	23.70	-47.20	-8.18	11.56	26.10	-45.30
		03/26/0500	08/14/0400	141	S3 (WHOI)	70	-1.01	8.50	24.30	-41.00	-5.59	10.53	28.40	-42.60
		03/26/0500	08/14/0400	141	S4 (WHOI)	90	0.67	6.63	26.00	-24.70	-2.18	9.59	29.30	-38.10
		03/26/0500	08/14/0400	141	S5 (WHOI)	110	-0.44	7.18	24.10	-32.00	0.15	9.18	30.30	-32.30

Table 2: Horizontal Current Components (cm/s): Common Time Period

Station	Water Depth (m)	Start Time (Mon/Day/Hr)	Stop Time (Mon/Day/Hr)	Duration (Days)	Instrument I.D.	Sensor Depth (m)	Cross-Shelf Mean	Cross-Shelf SD	Cross-Shelf Max	Cross-Shelf Min	Along-Shelf Mean	Along-Shelf SD	Along-Shelf Max	Along-Shelf Min
I3	90	04/12/1600	07/25/1000	103	04 (SIO)	10	-13.87	23.45	57.40	-86.30	-9.74	19.32	48.80	-72.40
		04/12/1600	07/25/1000	103	58 (SIO)	20	-5.02	16.32	32.80	-53.20	-7.65	17.16	37.50	-64.10
		04/12/1600	07/25/1000	103	01 (SIO)	53	0.45	12.13	30.60	-40.20	-2.89	11.66	28.30	-51.10
I4	130	04/12/1600	07/25/1000	103	09 (SIO)	10	-18.22	21.32	46.20	-85.10	-13.62	18.13	43.90	-76.20
		04/12/1600	07/25/1000	103	59 (SIO)	20	-8.19	16.05	34.50	-58.30	-10.42	15.57	31.70	-64.80
		04/12/1600	07/25/1000	103	03 (SIO)	53	-0.10	10.94	32.60	-38.10	-3.63	12.45	31.30	-51.40
N2	60	04/12/1600	07/25/1000	103	65 (SIO)	10	-2.14	6.55	26.60	-24.40	-4.49	25.51	78.80	-69.30
		04/12/1600	07/25/1000	103	13 (SIO)	20	1.70	5.07	18.60	-22.40	0.23	24.95	64.60	-66.80
		04/12/1600	07/25/1000	103	62 (SIO)	35	1.21	4.22	13.80	-14.00	1.17	16.32	43.60	-51.60
N3	90	04/12/1600	07/25/1000	103	11 (SIO)	10	-4.13	10.16	39.50	-42.50	-8.77	29.73	59.30	-108.90
		04/12/1600	07/25/1000	103	68 (SIO)	35	2.50	5.57	30.50	-24.50	-1.36	21.51	47.00	-73.30
		04/12/1600	07/25/1000	103	08 (SIO)	53	2.15	4.64	23.00	-17.60	1.93	18.44	45.10	-50.00
		04/12/1600	07/25/1000	103	64 (SIO)	70	0.71	5.73	20.00	-21.90	3.54	15.75	43.40	-41.80
		04/12/1600	07/25/1000	103	15 (SIO)	83	-0.51	8.29	29.70	-40.00	3.44	15.08	43.40	-47.20
N4	130	04/12/1600	07/25/1000	103	B1 (WHOI)	10	-5.74	15.42	40.30	-57.30	-16.30	25.19	43.70	-97.60
		04/12/1600	07/25/1000	103	B2 (WHOI)	20	0.30	10.33	37.50	-41.80	-12.82	21.75	39.40	-81.60
		04/12/1600	07/25/1000	103	S1 (WHOI)	35	0.76	9.38	30.00	-40.80	-9.39	19.09	37.20	-77.30
		04/12/1600	07/25/1000	103	S2 (WHOI)	55	2.48	6.89	24.40	-24.70	-4.81	17.03	36.20	-72.60
		04/12/1600	07/25/1000	103	S3 (WHOI)	70	1.97	6.25	22.40	-24.20	1.67	15.88	37.10	-64.70
		04/12/1600	07/25/1000	103	S4 (WHOI)	90	1.77	5.67	18.10	-21.40	1.14	15.24	34.80	-63.70
		04/12/1600	07/25/1000	103	S5 (WHOI)	110	1.45	6.06	26.40	-19.10	2.90	15.01	37.20	-59.60
		04/12/1600	07/25/1000	103	S6 (WHOI)	121	1.35	6.76	30.50	-20.30	4.43	14.99	33.00	-44.50
C2	60	04/12/1600	07/25/1000	103	56 (SIO)	10	-1.47	5.70	25.60	-22.90	3.39	19.66	44.50	-55.40
		04/12/1600	07/25/1000	103	02 (SIO)	20	3.44	6.27	27.30	-16.10	7.01	19.42	50.50	-58.40
		04/12/1600	07/25/1000	103	51 (SIO)	35	0.93	4.42	18.00	-14.30	3.78	13.82	36.80	-45.90
		04/12/1600	07/25/1000	103	61 (SIO)	53	0.03	3.79	15.10	-33.70	2.35	9.04	32.80	-37.90
C3	90	04/12/1600	07/25/1000	103	B3 (WHOI)	5	-6.33	11.68	41.80	-59.40	-7.62	25.78	61.20	-86.30
		04/12/1600	07/25/1000	103	B4 (WHOI)	10	-4.62	10.61	40.10	-50.70	-4.66	25.15	46.20	-91.00

Table 2: Horizontal Current Components (cm/s) (Continued)

Station	Water Depth (m)	Start Time (Mon/Day/Hr)	Stop Time (Mon/Day/Hr)	Duration (Days)	Instrument I.D.	Sensor Depth (m)	Cross-Shelf Mean	Cross-Shelf SD	Cross-Shelf Max	Cross-Shelf Min	Along-Shelf Mean	Along-Shelf SD	Along-Shelf Max	Along-Shelf Min
		04/12/1600	07/25/1000	103	53 (SIO)	10	-4.27	10.19	38.40	-48.00	-7.16	26.07	46.60	-94.60
		04/12/1600	07/25/1000	103	B5 (WHOI)	15	-3.73	9.33	29.90	-47.00	-5.16	23.37	46.40	-81.60
		04/12/1600	07/25/1000	103	06 (SIO)	20	-0.89	8.90	27.30	-47.90	-3.50	24.96	48.20	-83.60
		04/12/1600	07/25/1000	103	69 (SIO)	35	0.15	5.55	20.60	-35.20	-1.36	18.53	39.40	-69.00
		04/12/1600	07/25/1000	103	12 (SIO)	53	0.78	4.66	15.20	-24.20	0.83	16.41	34.60	-58.10
		04/12/1600	07/25/1000	103	67 (SIO)	70	0.22	4.45	20.50	-27.30	1.28	14.77	33.40	-50.10
		04/12/1600	07/25/1000	103	14 (SIO)	83	0.06	4.49	18.70	-27.50	1.14	12.30	29.70	-36.20
C4	130	04/12/1600	07/25/1000	103	B2 (WHOI)	10	-8.53	14.50	43.70	-52.80	-21.29	23.64	36.40	-90.70
		04/12/1600	07/25/1000	103	B3 (WHOI)	20	-4.12	9.78	30.80	-38.20	-16.39	20.37	29.60	-82.40
		04/12/1600	07/25/1000	103	S1 (WHOI)	35	-2.17	7.98	30.50	-34.30	-11.13	16.21	26.50	-71.10
		04/12/1600	07/25/1000	103	S2 (WHOI)	55	0.23	6.53	24.60	-36.70	-7.28	14.33	25.60	-60.50
		04/12/1600	07/25/1000	103	S3 (WHOI)	70	0.48	6.44	23.90	-39.00	-4.82	13.23	25.80	-62.10
		04/12/1600	07/25/1000	103	S4 (WHOI)	90	0.29	6.06	16.50	-42.90	-1.97	12.10	26.40	-59.50
		04/12/1600	07/25/1000	103	S6 (WHOI)	121	0.07	6.20	16.70	-28.80	1.36	11.37	33.80	-41.50
C5	400	04/12/1600	07/25/1000	103	B3 (WHOI)	20	-2.56	13.40	43.70	-58.90	-16.70	20.20	26.40	-73.00
		04/12/1600	07/25/1000	103	B4 (WHOI)	35	0.08	11.68	41.30	-55.60	-12.81	16.98	26.60	-60.80
		04/12/1600	07/25/1000	103	B5 (WHOI)	55	2.41	9.17	31.80	-44.00	-8.52	14.19	27.00	-54.20
		04/12/1600	07/25/1000	103	S1 (WHOI)	70	2.37	7.98	32.50	-30.90	-5.45	12.89	33.40	-50.20
		04/12/1600	07/25/1000	103	S2 (WHOI)	90	2.18	6.91	28.50	-21.60	-1.66	10.68	28.60	-43.80
		04/12/1600	07/25/1000	103	S3 (WHOI)	110	3.26	7.41	28.50	-21.20	0.69	10.70	33.10	-38.10
		04/12/1600	07/25/1000	103	S4 (WHOI)	150	3.28	6.49	25.70	-15.00	5.63	11.05	36.70	-27.60
		04/12/1600	07/25/1000	103	S5 (WHOI)	250	4.05	5.14	21.10	-12.50	11.22	10.11	41.30	-13.90
		04/12/1600	07/25/1000	103	S6 (WHOI)	350	2.78	5.19	20.30	-16.10	6.45	7.42	31.70	-25.00
R2	60	04/12/1600	07/25/1000	103	10 (SIO)	20	1.93	4.37	17.60	-20.40	6.27	14.06	41.10	-47.50
		04/12/1600	07/25/1000	103	50 (SIO)	35	1.74	3.55	19.90	-9.00	6.03	11.01	35.00	-30.90
		04/12/1600	07/25/1000	103	66 (SIO)	53	0.36	3.85	15.10	-19.50	3.39	7.10	40.70	-19.70
R3	90	04/12/1600	07/25/1000	103	07 (SIO)	20	0.58	8.21	28.60	-30.80	-0.45	18.45	35.40	-72.00
		04/12/1600	07/25/1000	103	54 (SIO)	35	0.99	4.73	19.50	-22.50	-0.15	14.52	33.80	-56.90
		04/12/1600	07/25/1000	103	05 (SIO)	53	1.07	4.07	14.60	-19.50	1.33	13.10	36.80	-52.00
		04/12/1600	07/25/1000	103	55 (SIO)	70	1.05	3.77	14.60	-14.30	1.90	12.53	35.30	-48.50

Table 2: Horizontal Current Components (cm/s) (Continued)

Station	Water Depth (m)	Start Time (Mon/Day/Hr)	Stop Time (Mon/Day/Hr)	Duration (Days)	Instrument I.D.	Sensor Depth (m)	Cross-Shelf Mean	Cross-Shelf SD	Cross-Shelf Max	Cross-Shelf Min	Along-Shelf Mean	Along-Shelf SD	Along-Shelf Max	Along-Shelf Min
R4	130	04/12/1600	07/25/1000	103	B1 (WHOI)	10	-15.36	18.93	38.40	-75.20	-21.99	21.11	33.80	-86.90
		04/12/1600	07/25/1000	103	B2 (WHOI)	20	-7.98	13.96	29.00	-59.80	-17.34	18.21	30.80	-71.00
		04/12/1600	07/25/1000	103	S1 (WHOI)	35	-5.04	12.01	31.90	-56.10	-12.90	14.81	24.60	-60.70
		04/12/1600	07/25/1000	103	S2 (WHOI)	55	-2.00	9.00	23.70	-43.30	-8.01	12.12	26.10	-43.50
		04/12/1600	07/25/1000	103	S3 (WHOI)	70	-0.08	7.55	24.30	-31.10	-5.44	10.92	27.10	-38.90
		04/12/1600	07/25/1000	103	S4 (WHOI)	90	0.71	6.63	23.10	-24.70	-2.70	10.27	26.80	-38.10
		04/12/1600	07/25/1000	103	S5 (WHOI)	110	0.07	6.71	18.90	-25.80	-0.16	9.48	26.90	-32.30

I3 : ALONG-SHELF CURRENT

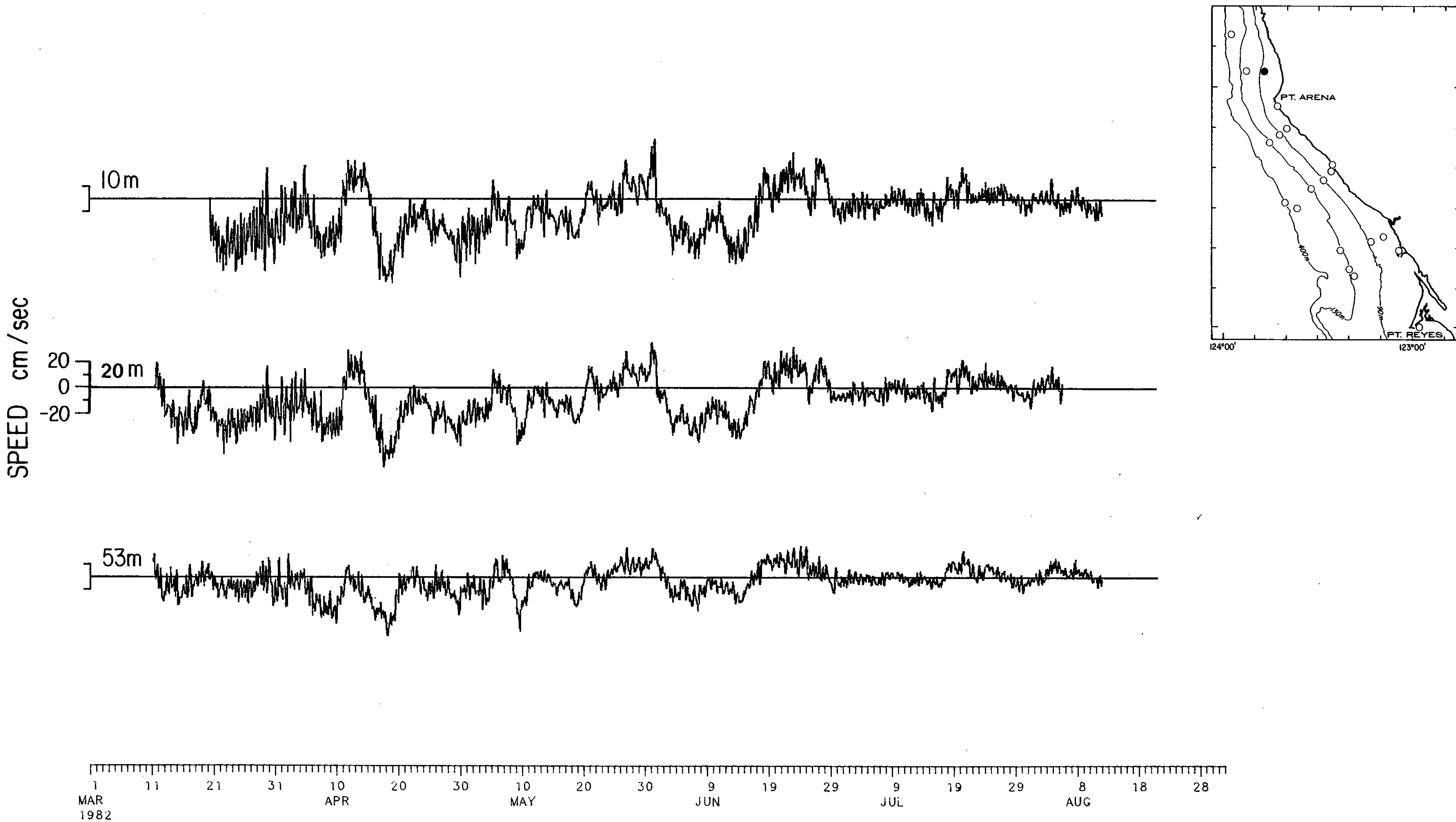

Figure 2

I3: CROSS-SHELF CURRENT

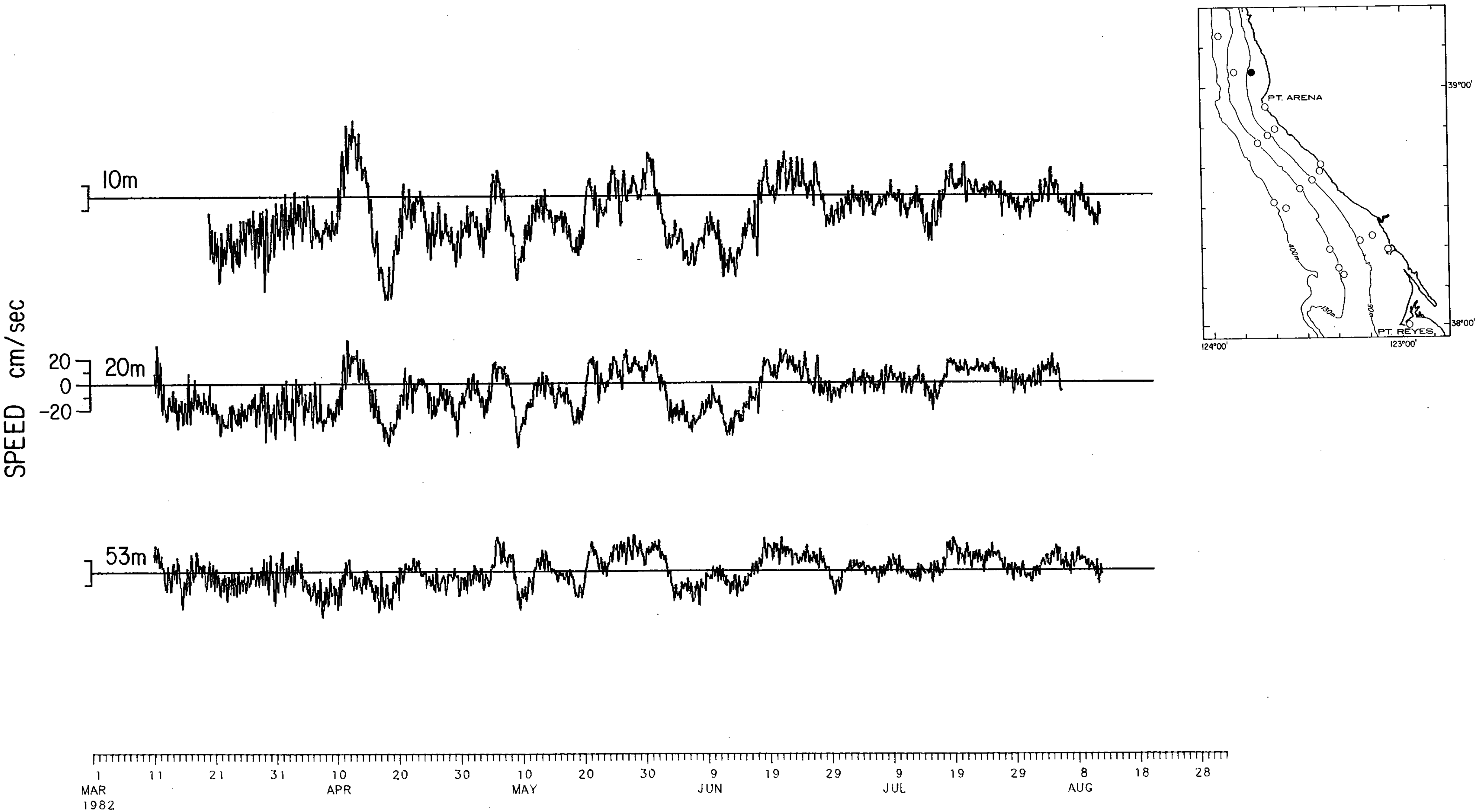

Figure 3

I4 : ALONG-SHELF CURRENT

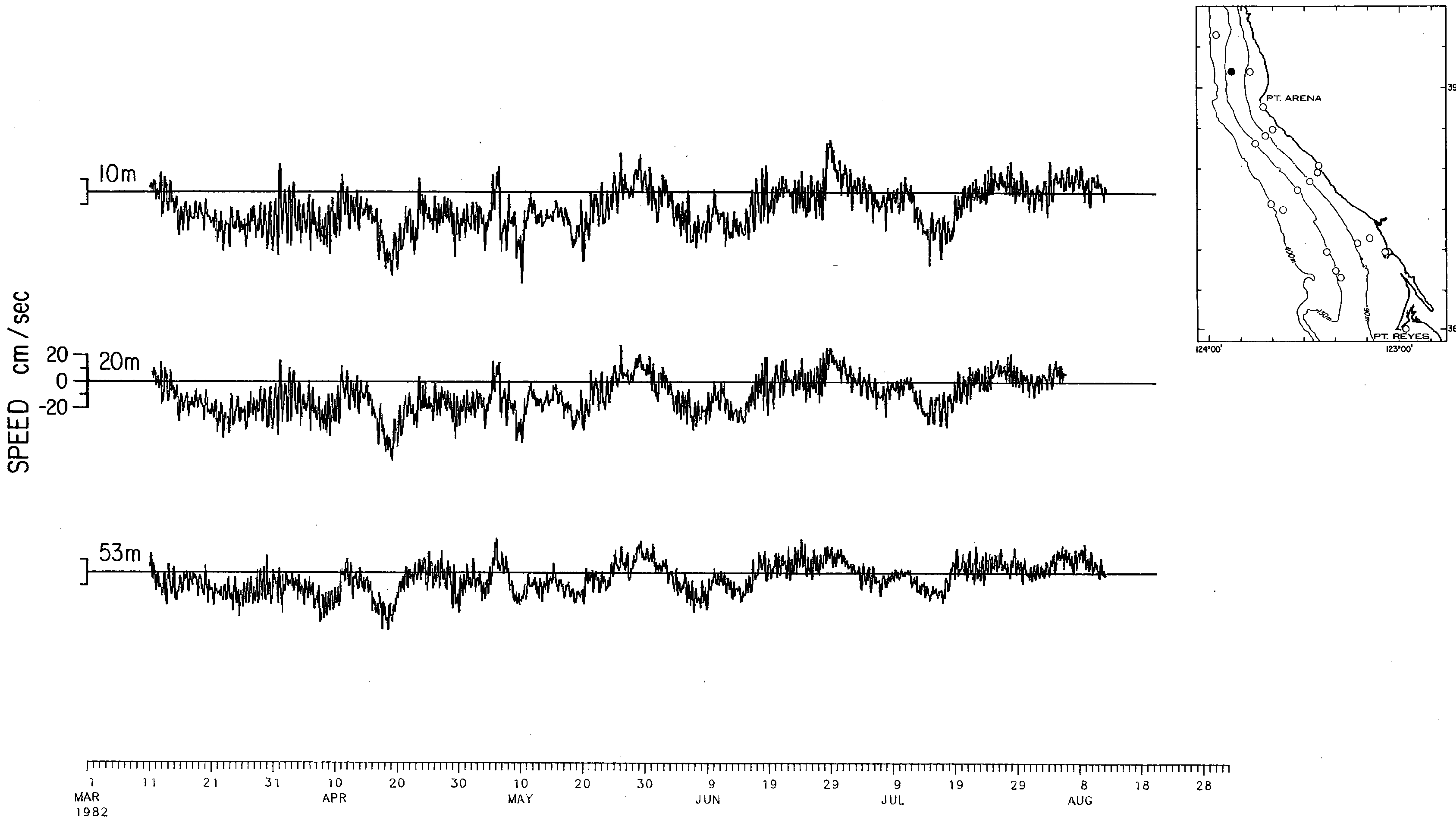

Figure 4

I4 : CROSS-SHELF CURRENT

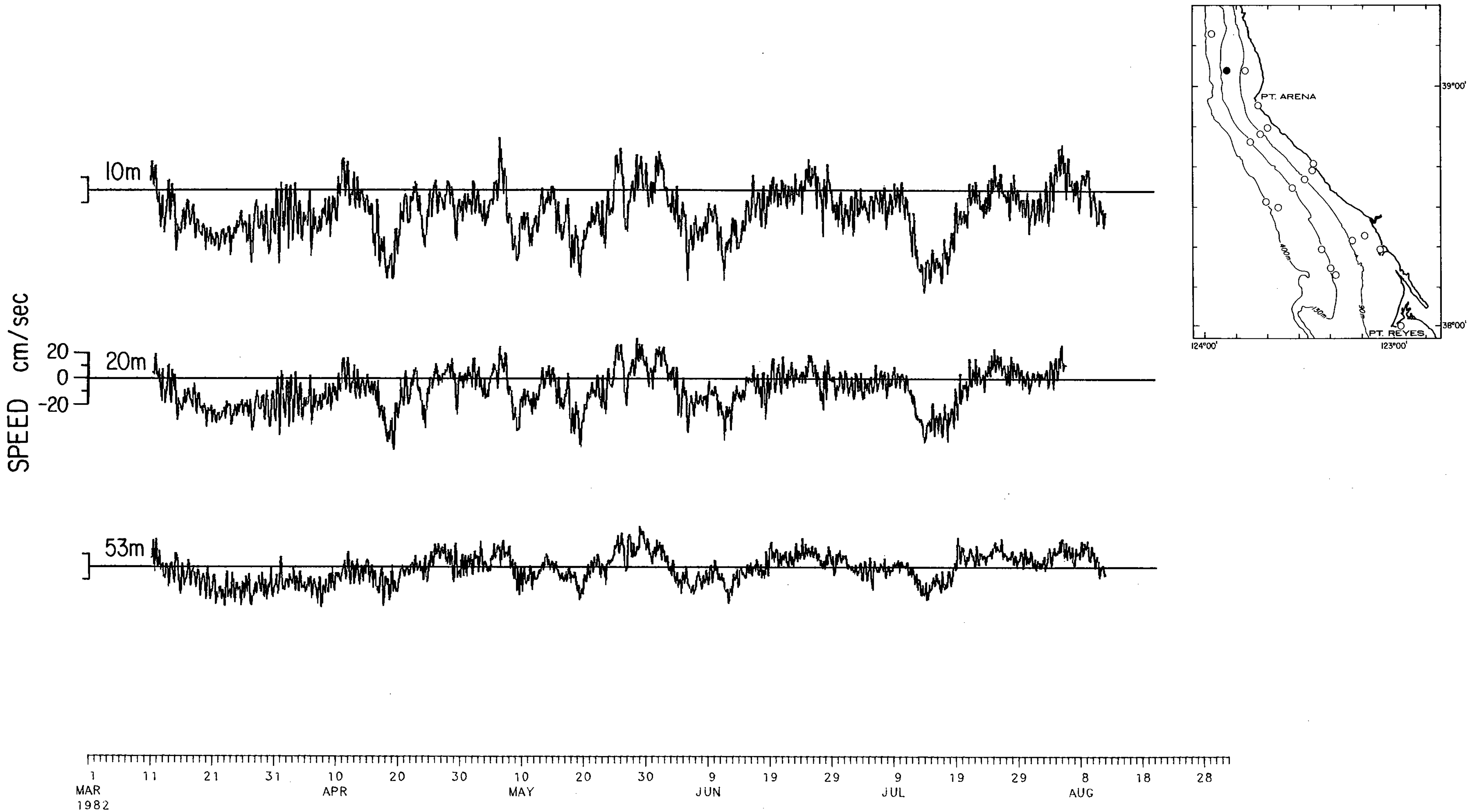

Figure 5

N2 : ALONG-SHELF CURRENT

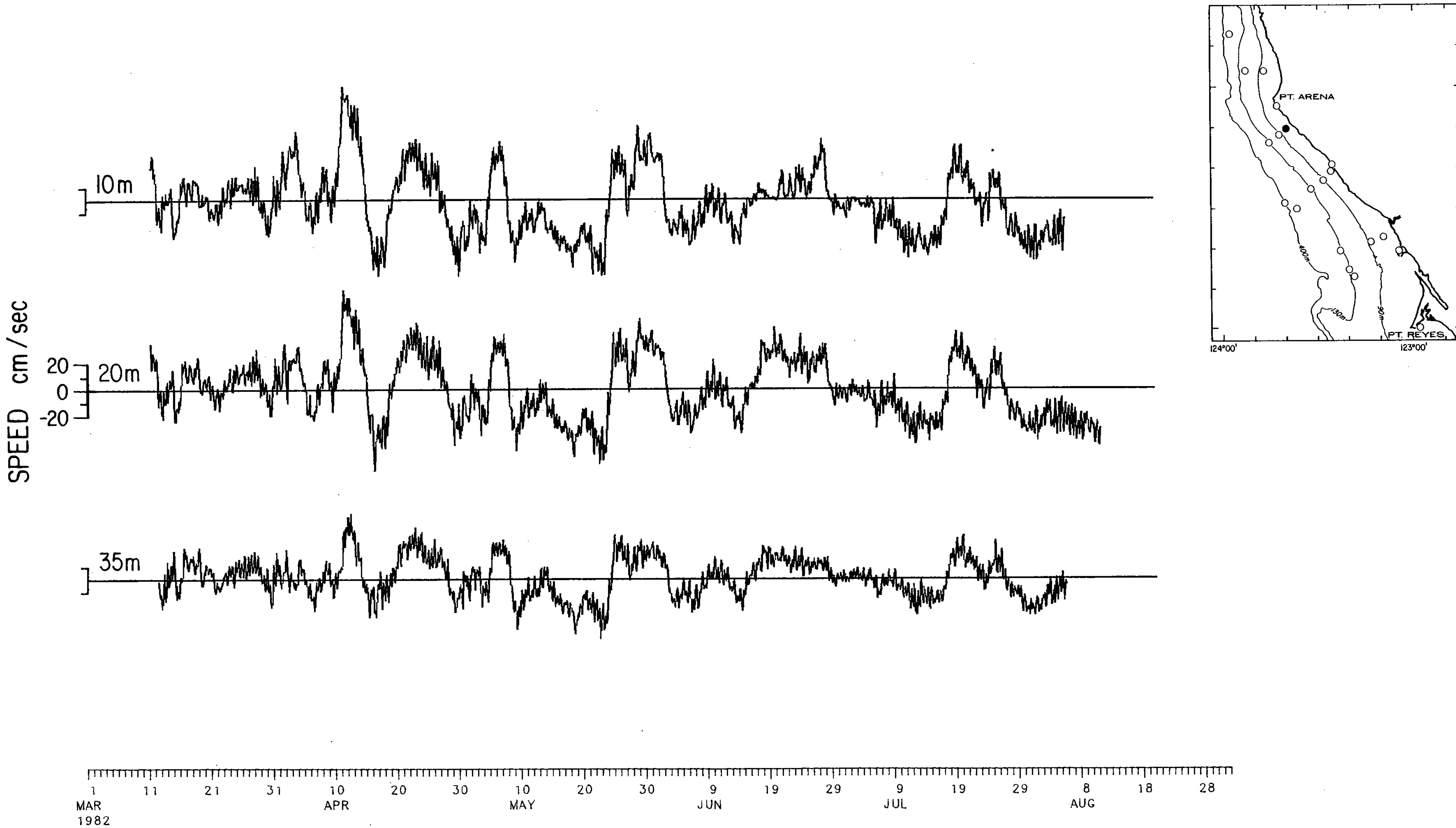

Figure 6

N2 : CROSS-SHELF CURRENT

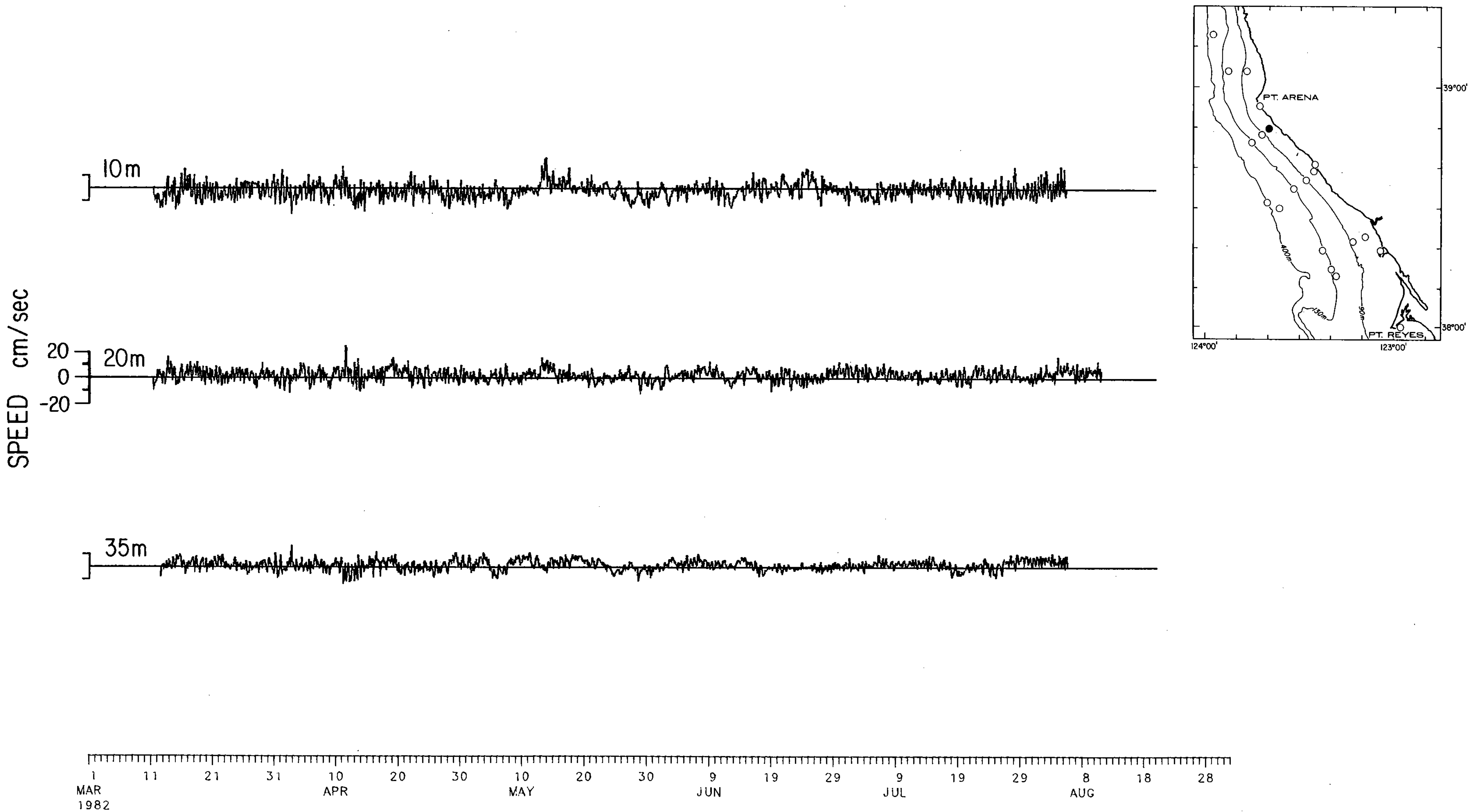

Figure 7

N3 : ALONG-SHELF CURRENT

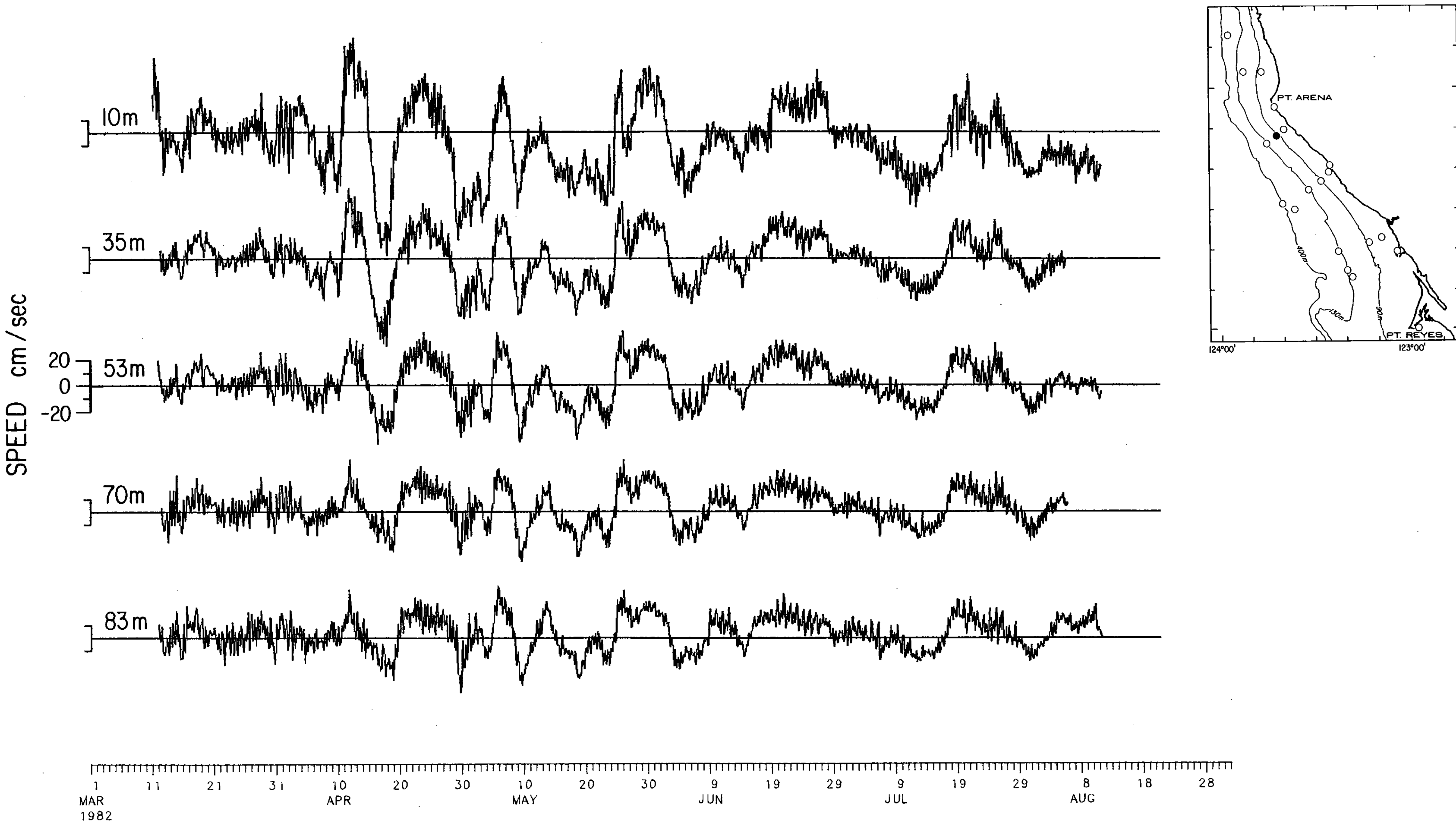

Figure 8

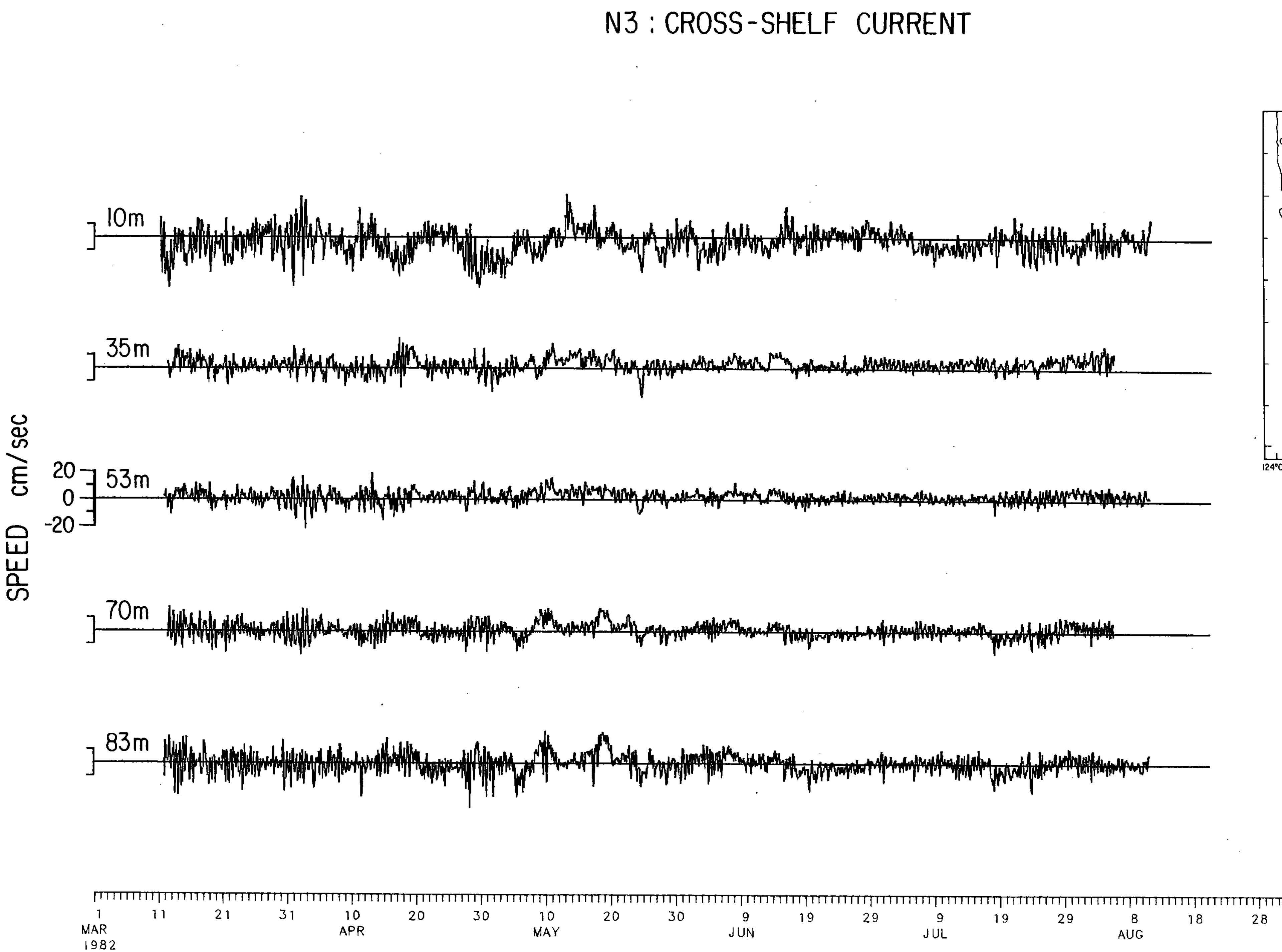
N3 : CROSS-SHELF CURRENT
10m
35m
53m
70m
83m
20
0
-20
SPEED cm/sec
1
MAR
1982
11
21
31
10
APR
20
30
10
MAY
20
30
9
JUN
19
29
9
JUL
19
29
8
AUG
18
28
PT. ARENA
PT. REYES
39°00'
38°00'
124°00'
123°00'
400m
130m
90m

Figure 9

N4 : ALONG-SHELF CURRENT

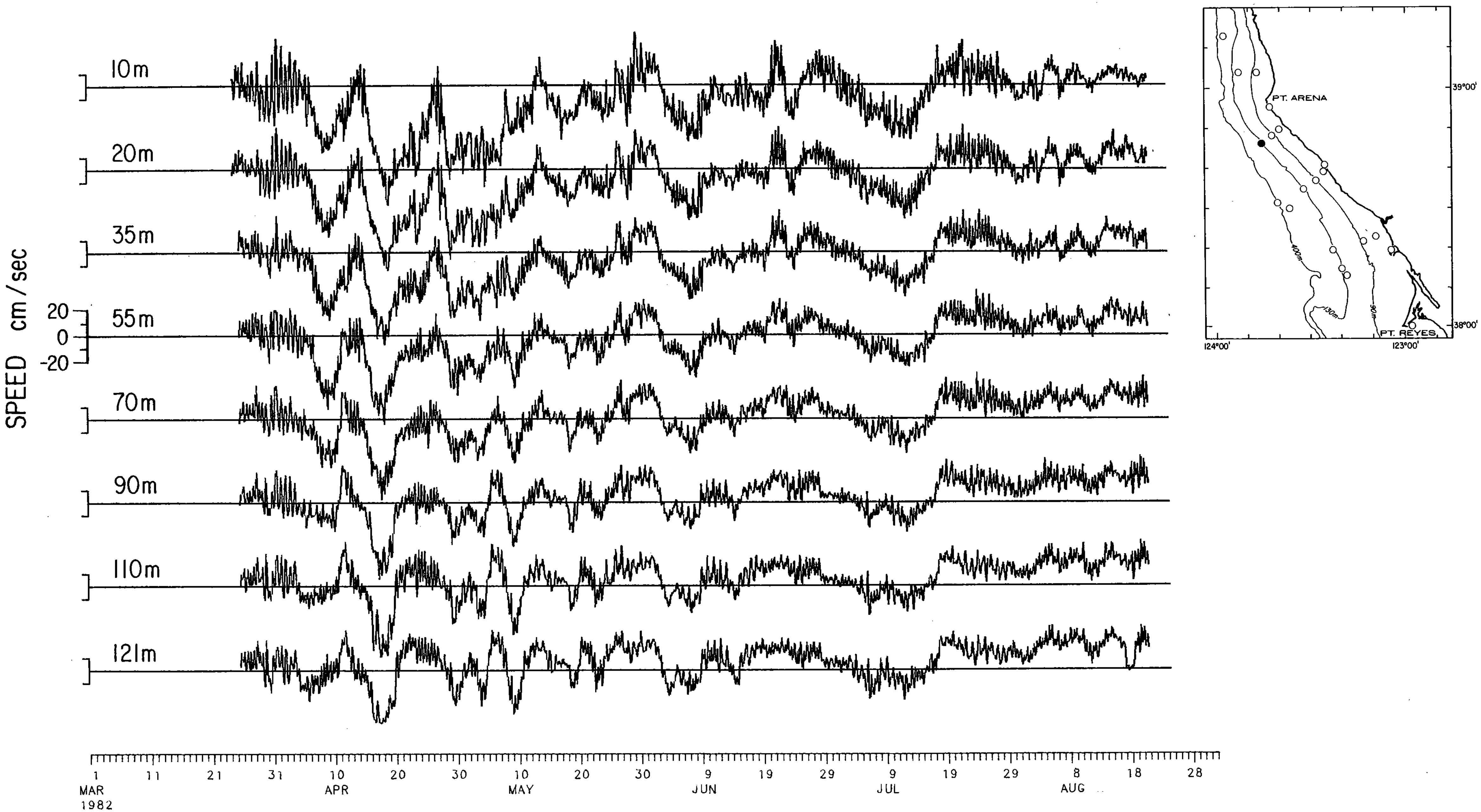

Figure 10

N4 : CROSS-SHELF CURRENT

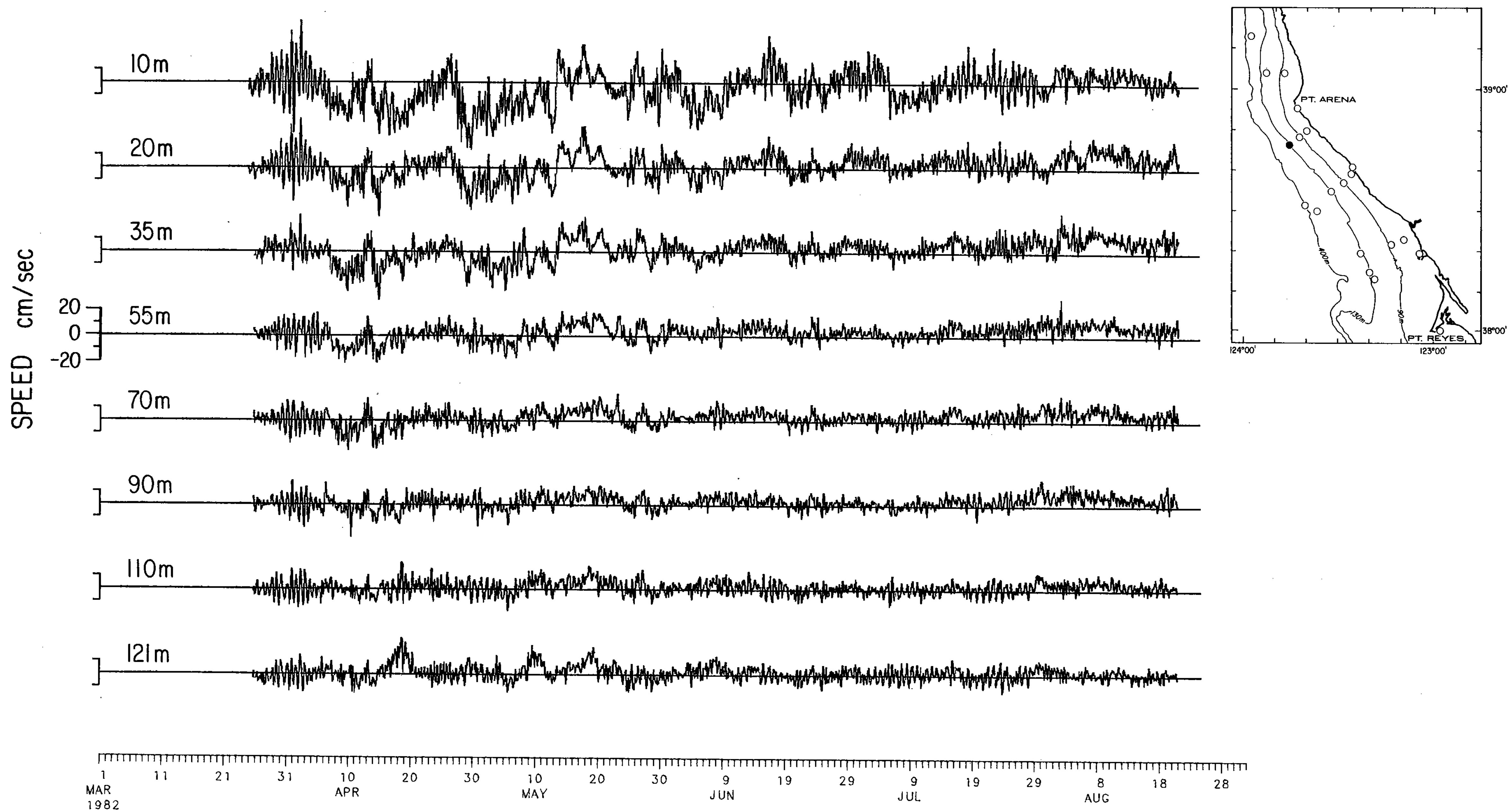

Figure 11

C2 : ALONG-SHELF CURRENT

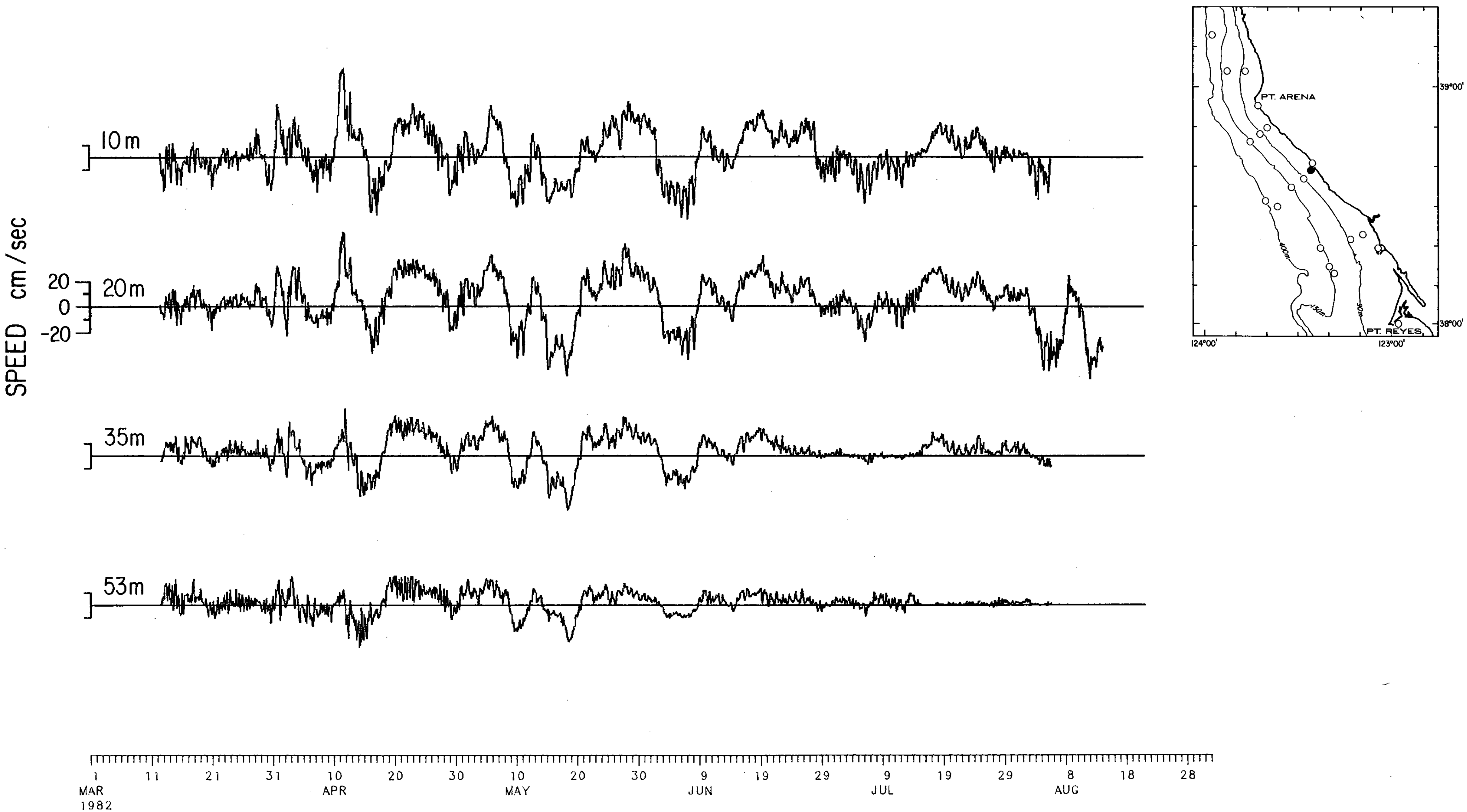

Figure 12

C2 : CROSS-SHELF CURRENT

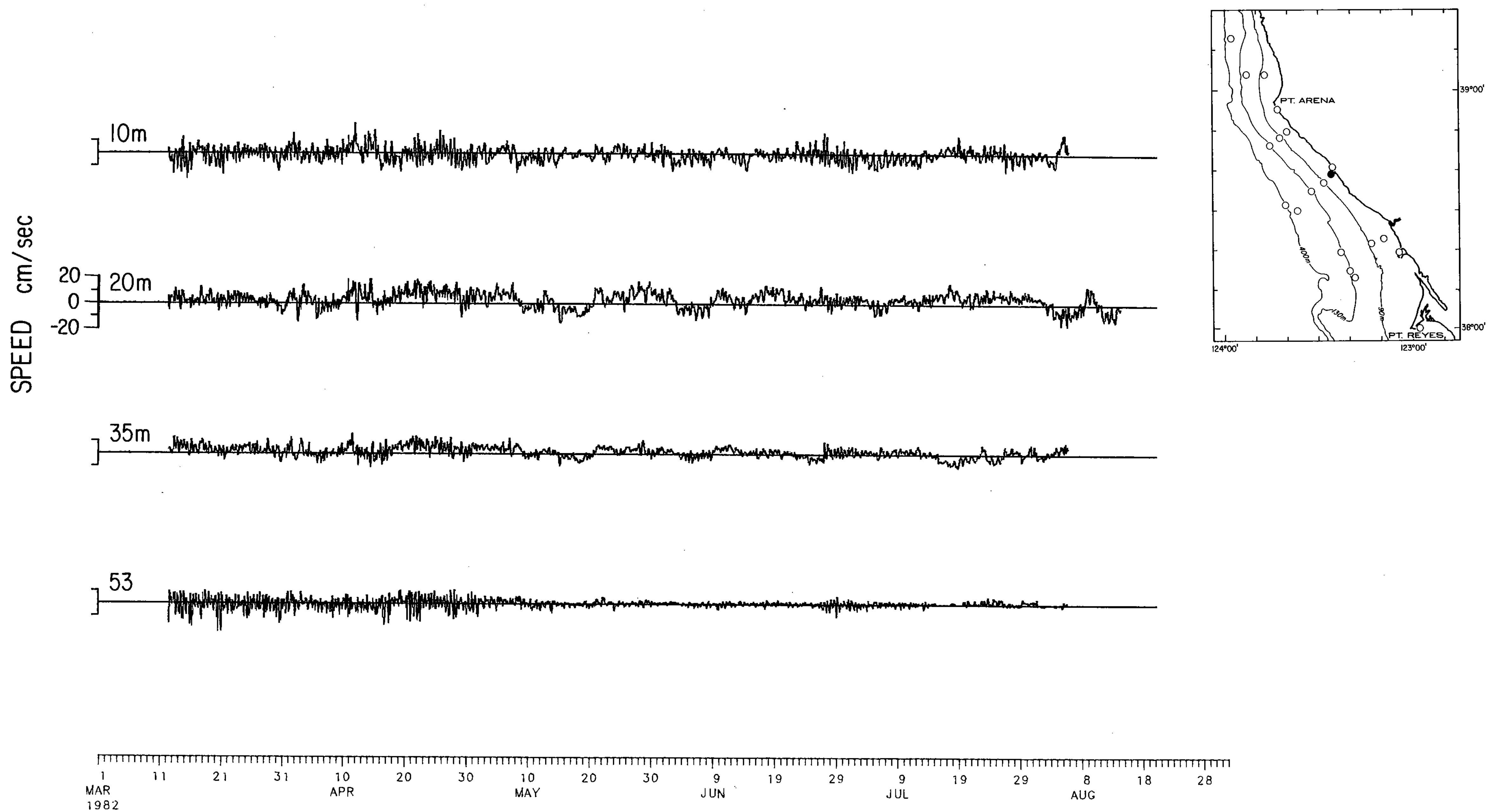

Figure 13

C3 : ALONG-SHELF CURRENT

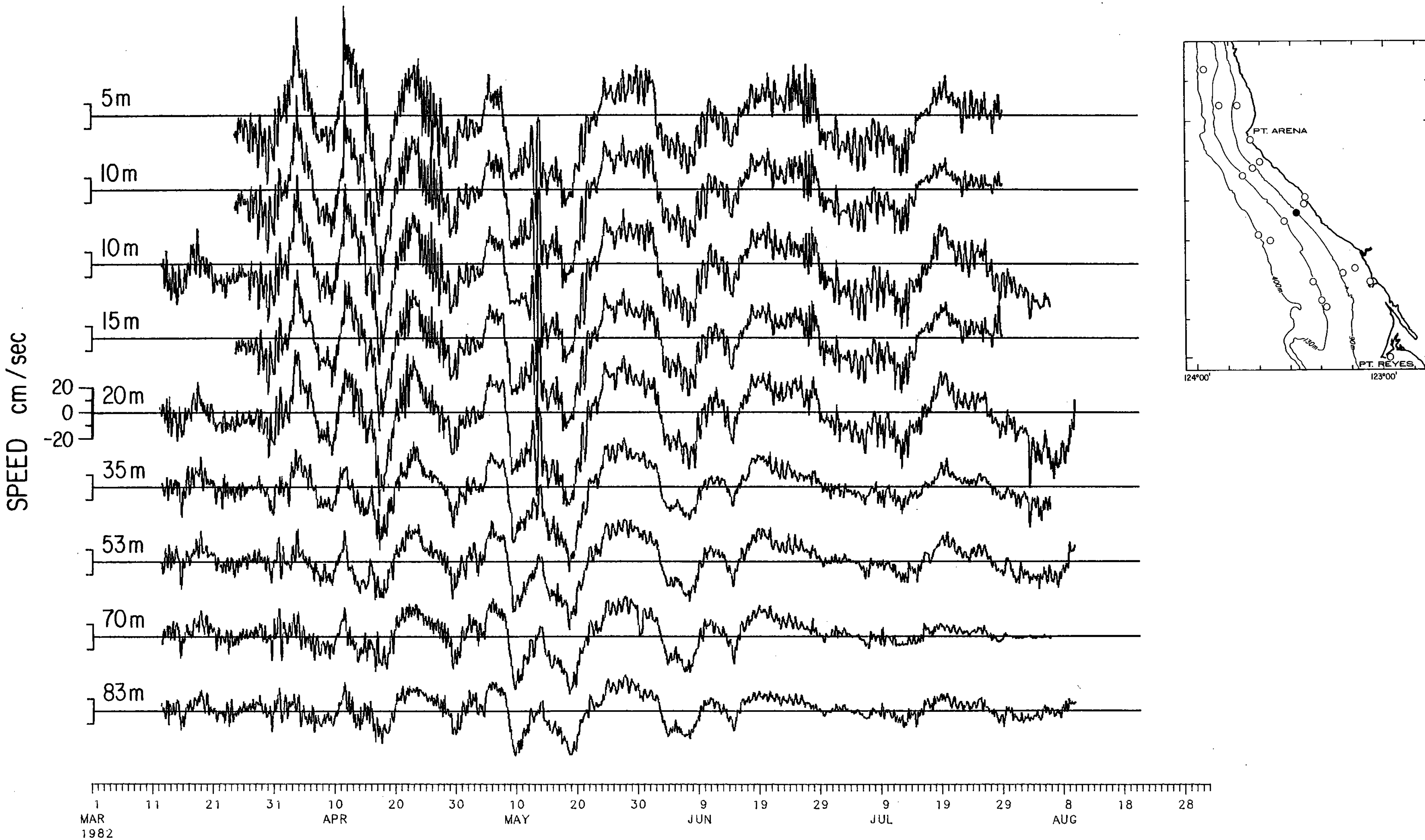

Figure 14

C3 : CROSS-SHELF CURRENT

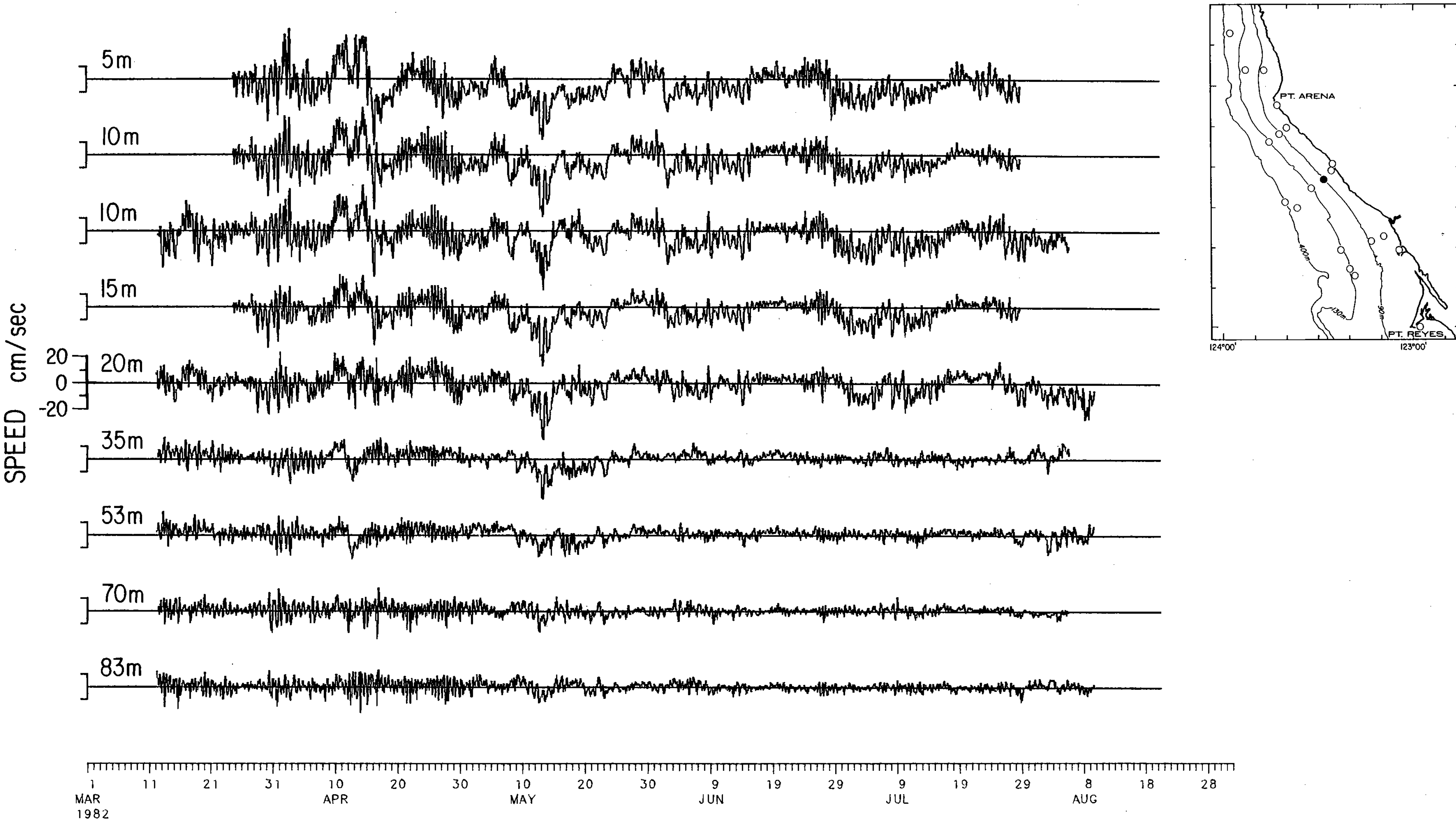

Figure 15

C4 : ALONG-SHELF CURRENT

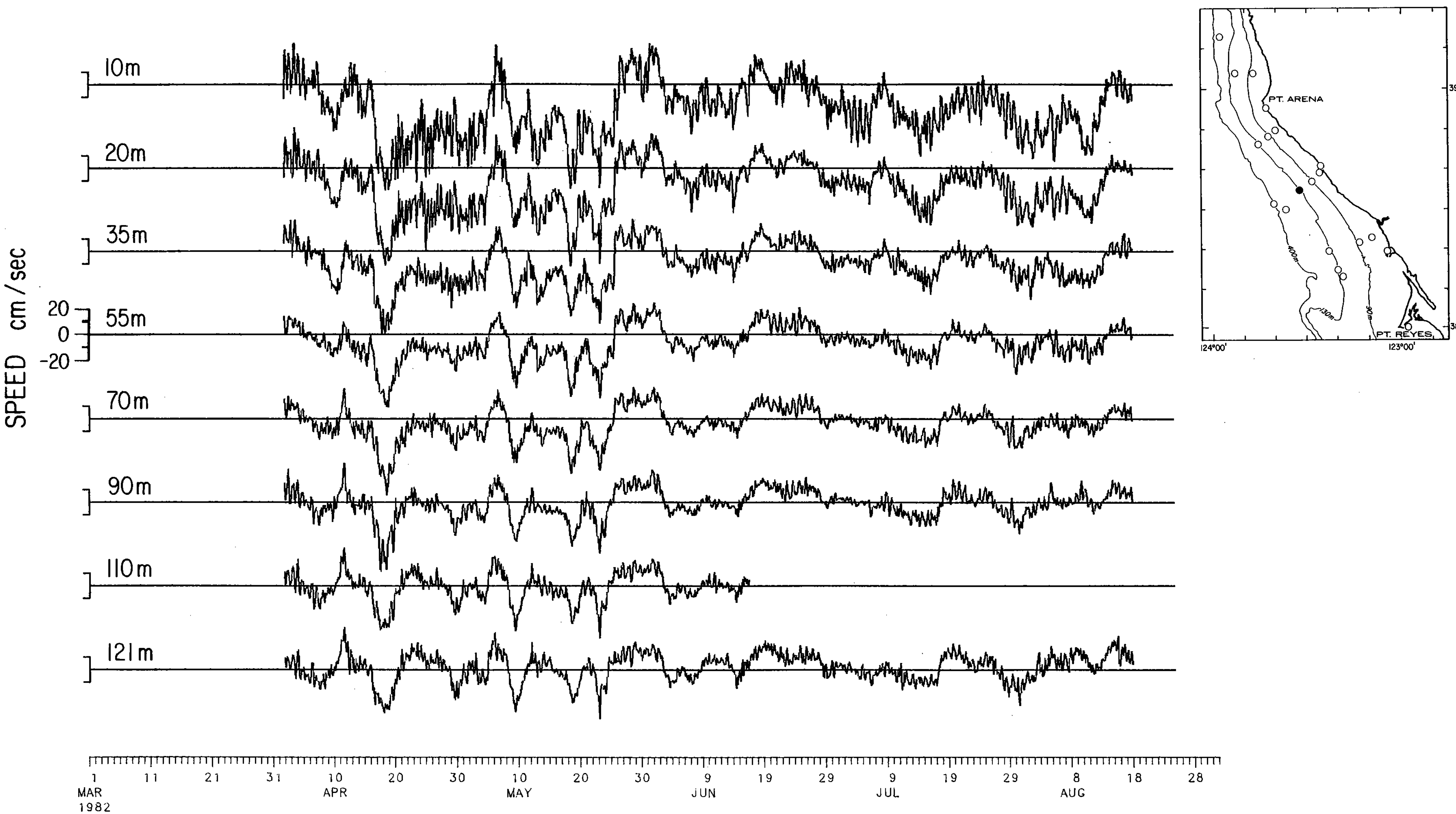

Figure 16

C4 : CROSS-SHELF CURRENT

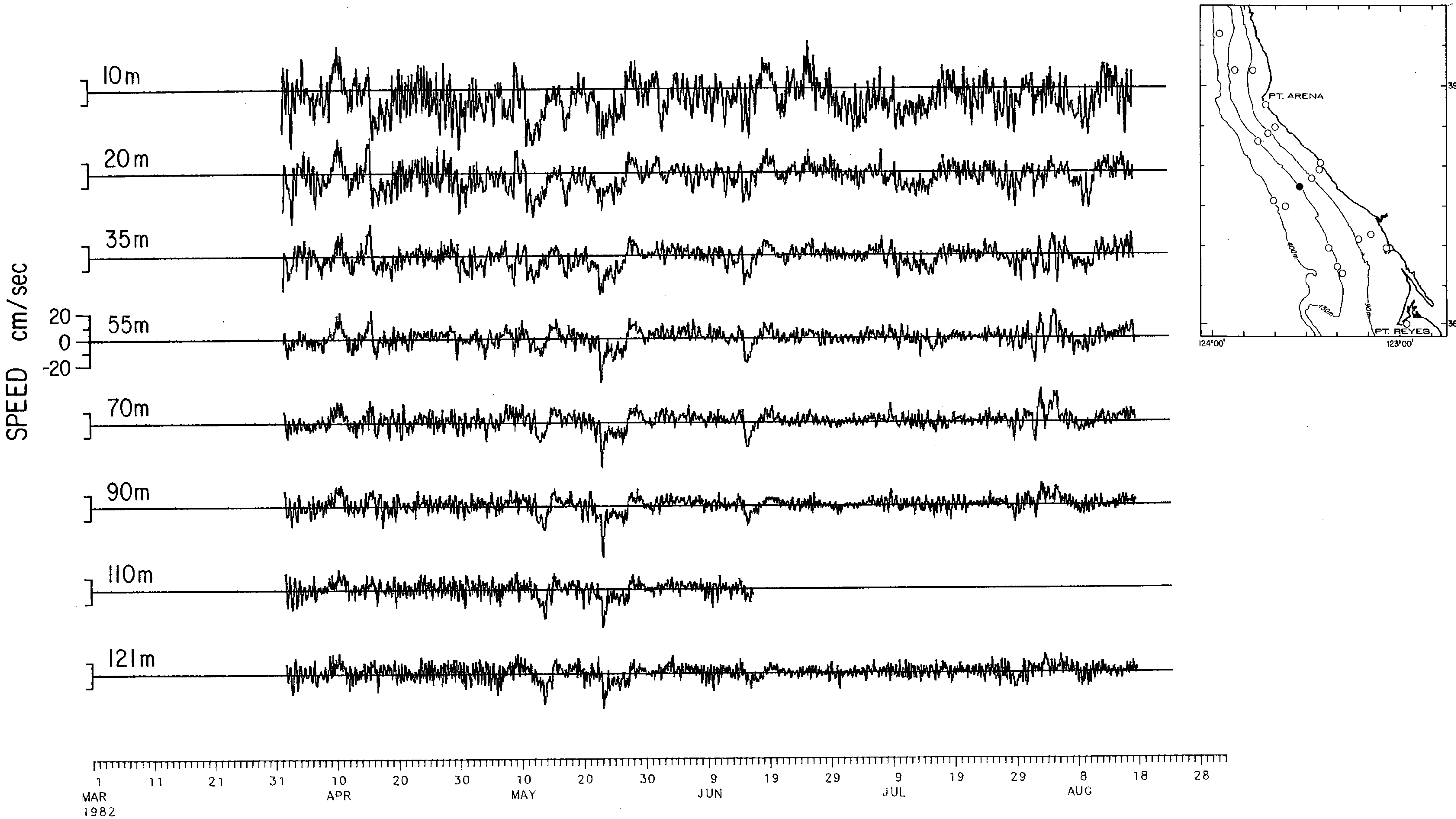

Figure 17

C5 : ALONG-SHELF CURRENT

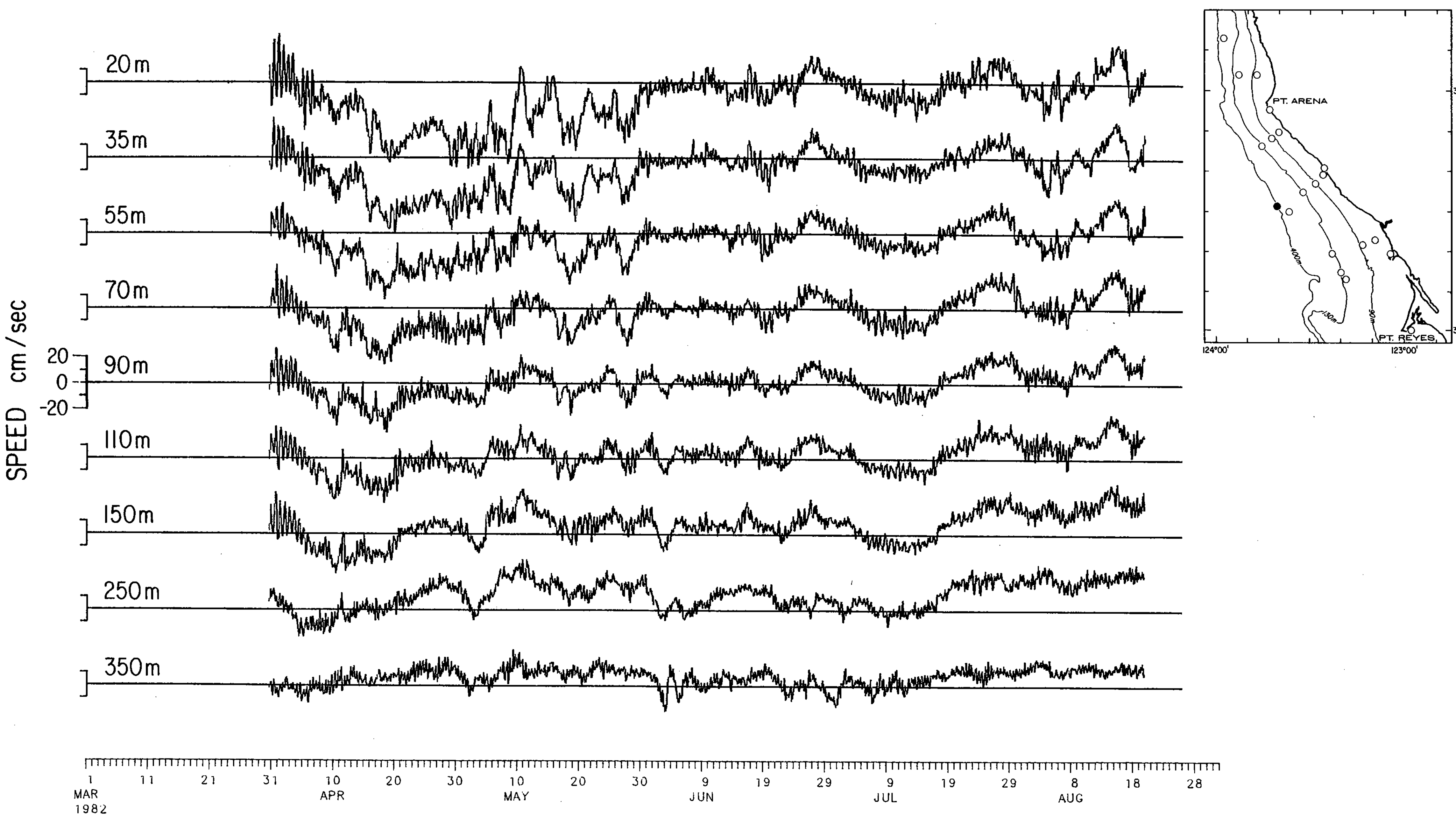

Figure 18

C5 : CROSS-SHELF CURRENT

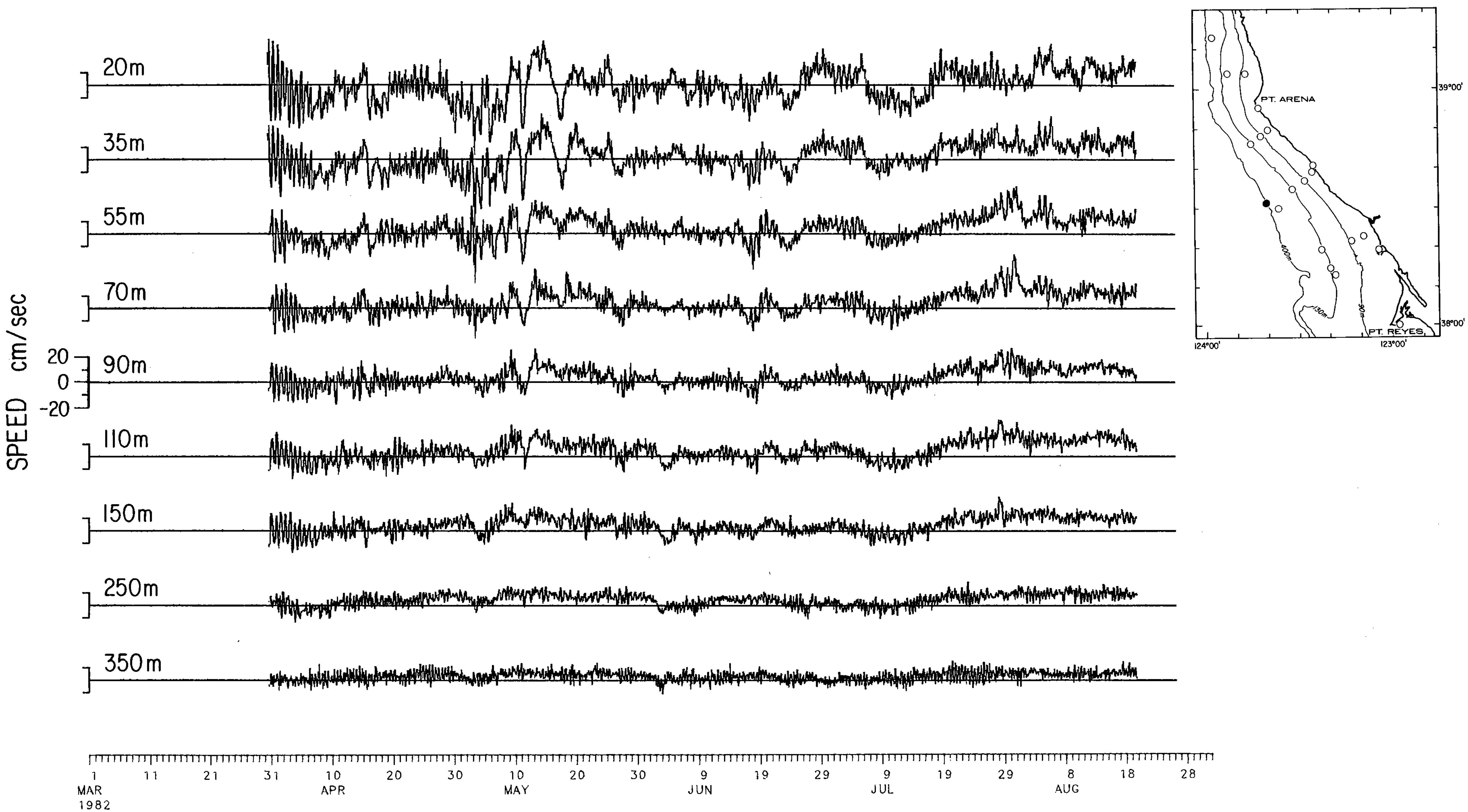

Figure 19

R2 : ALONG SHELF CURRENT

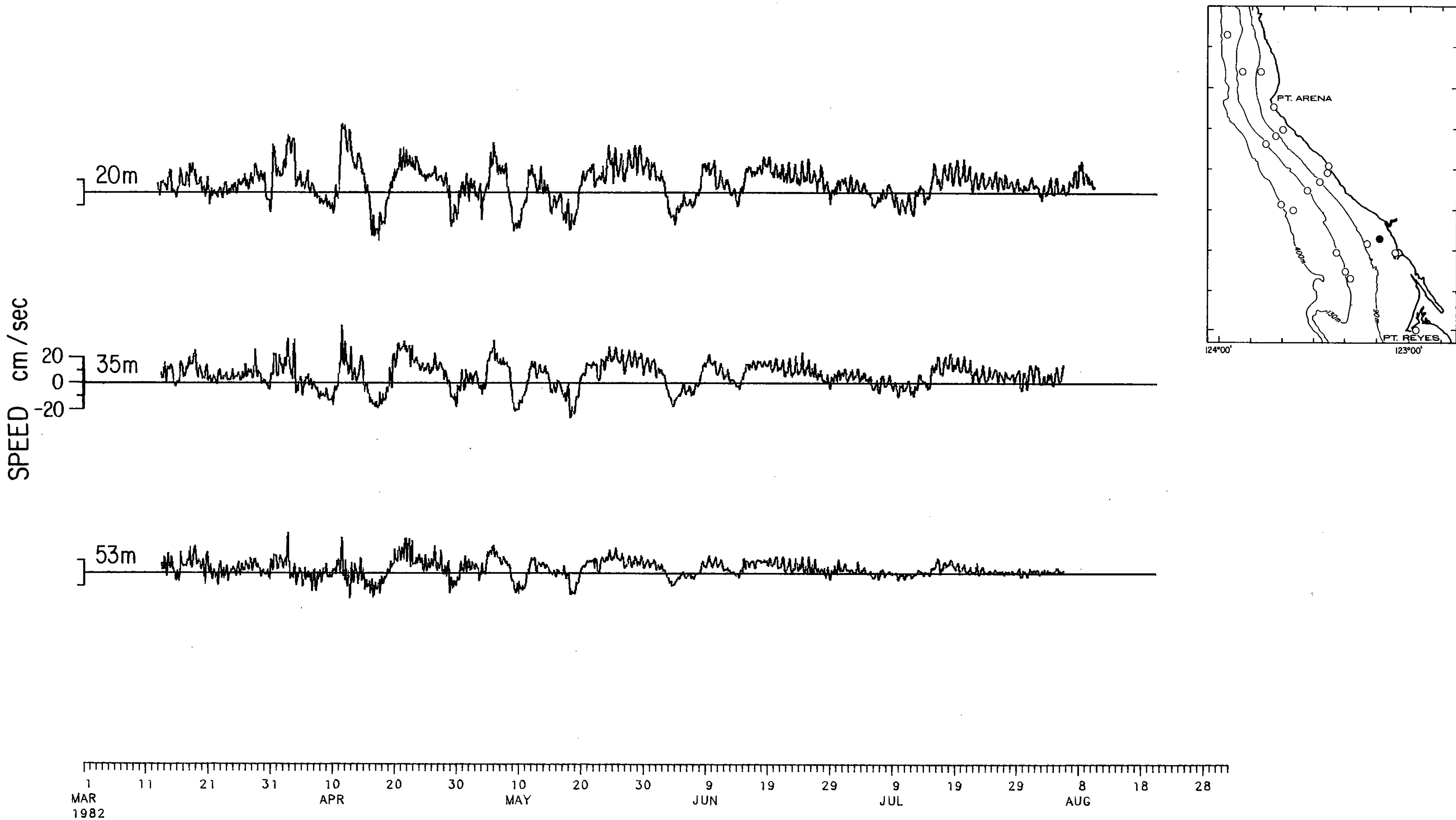

Figure 20

R2 : CROSS-SHELF CURRENT

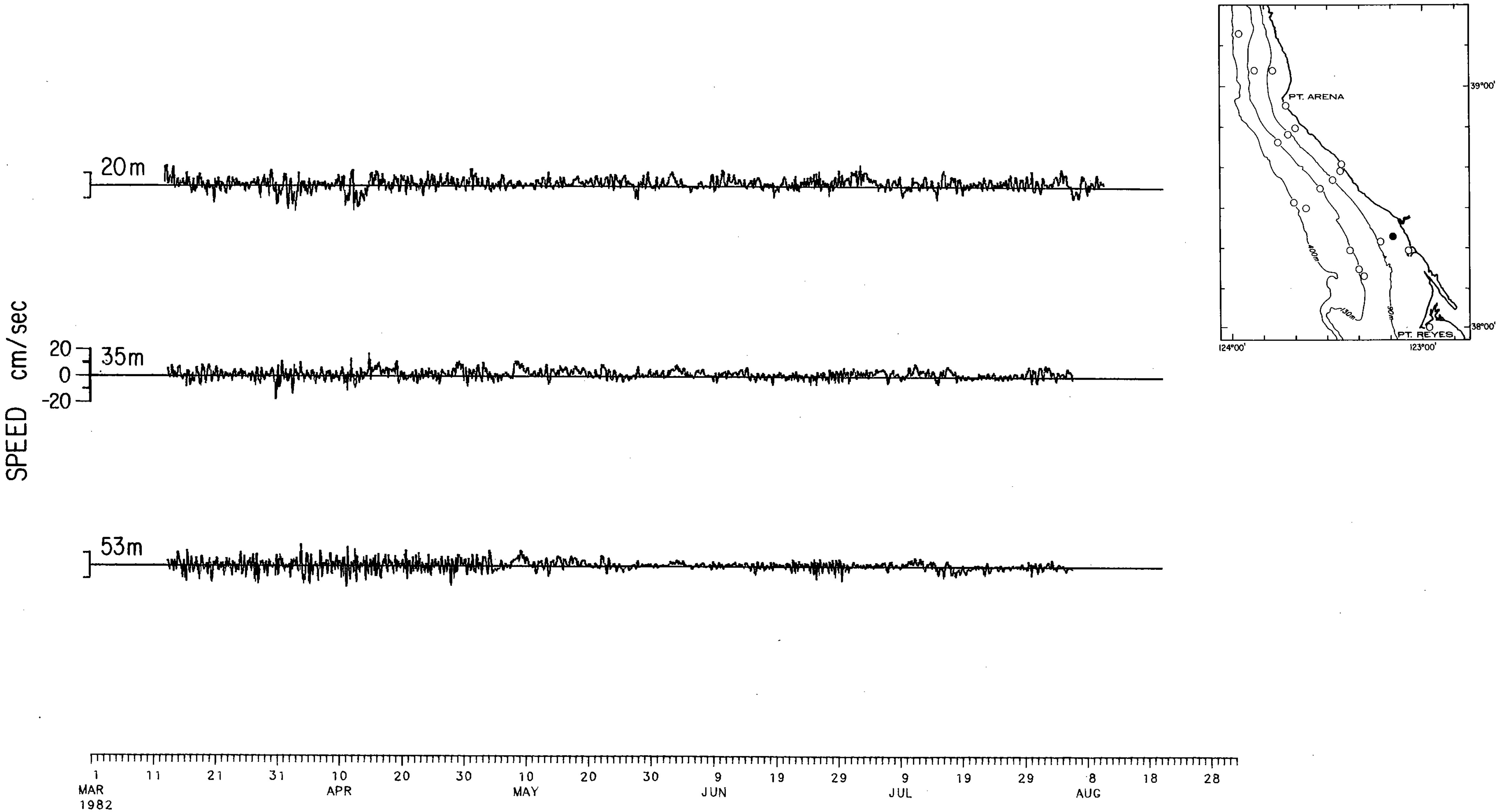

Figure 21

R3 : ALONG-SHELF CURRENT

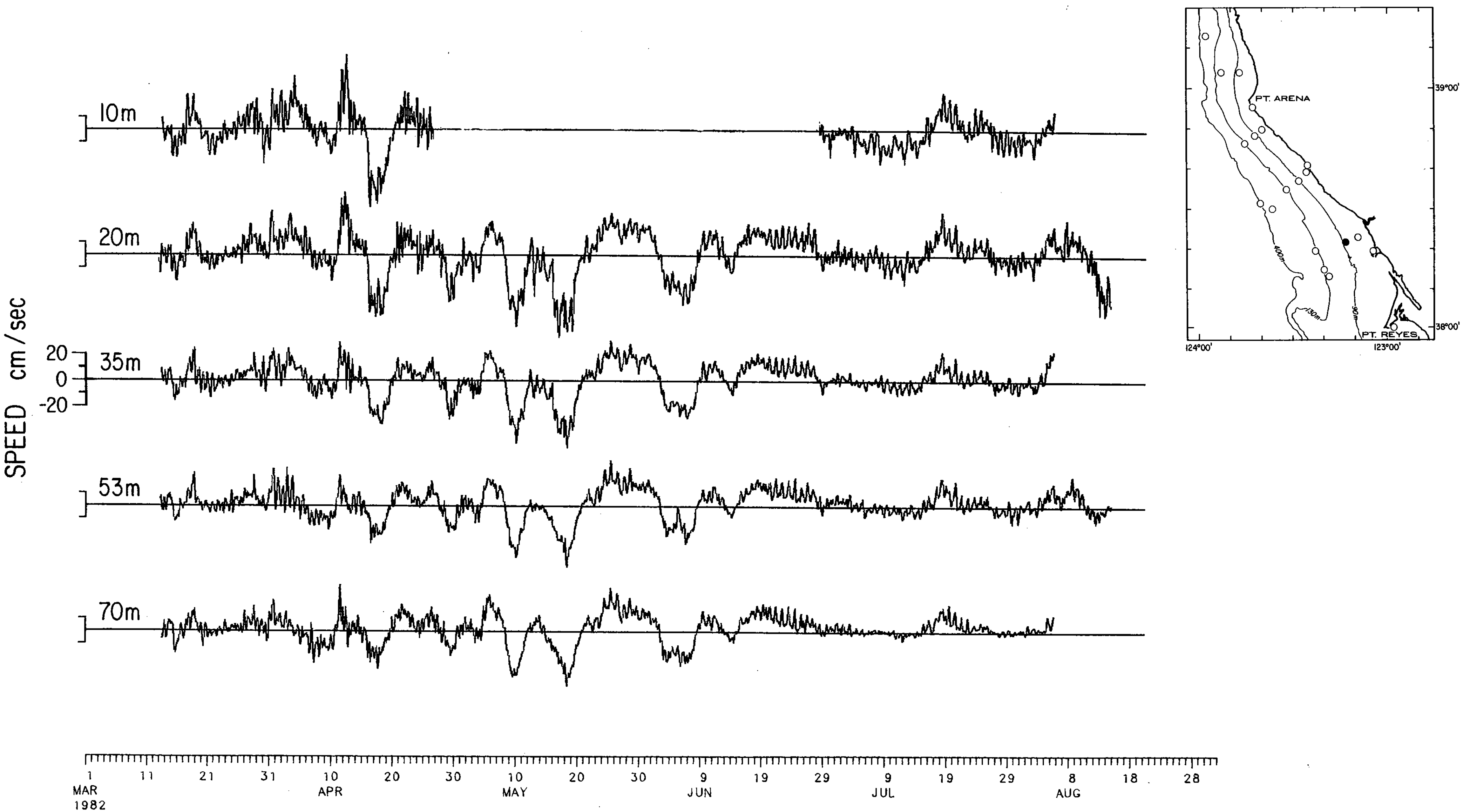

Figure 22

R3 : CROSS-SHELF CURRENT

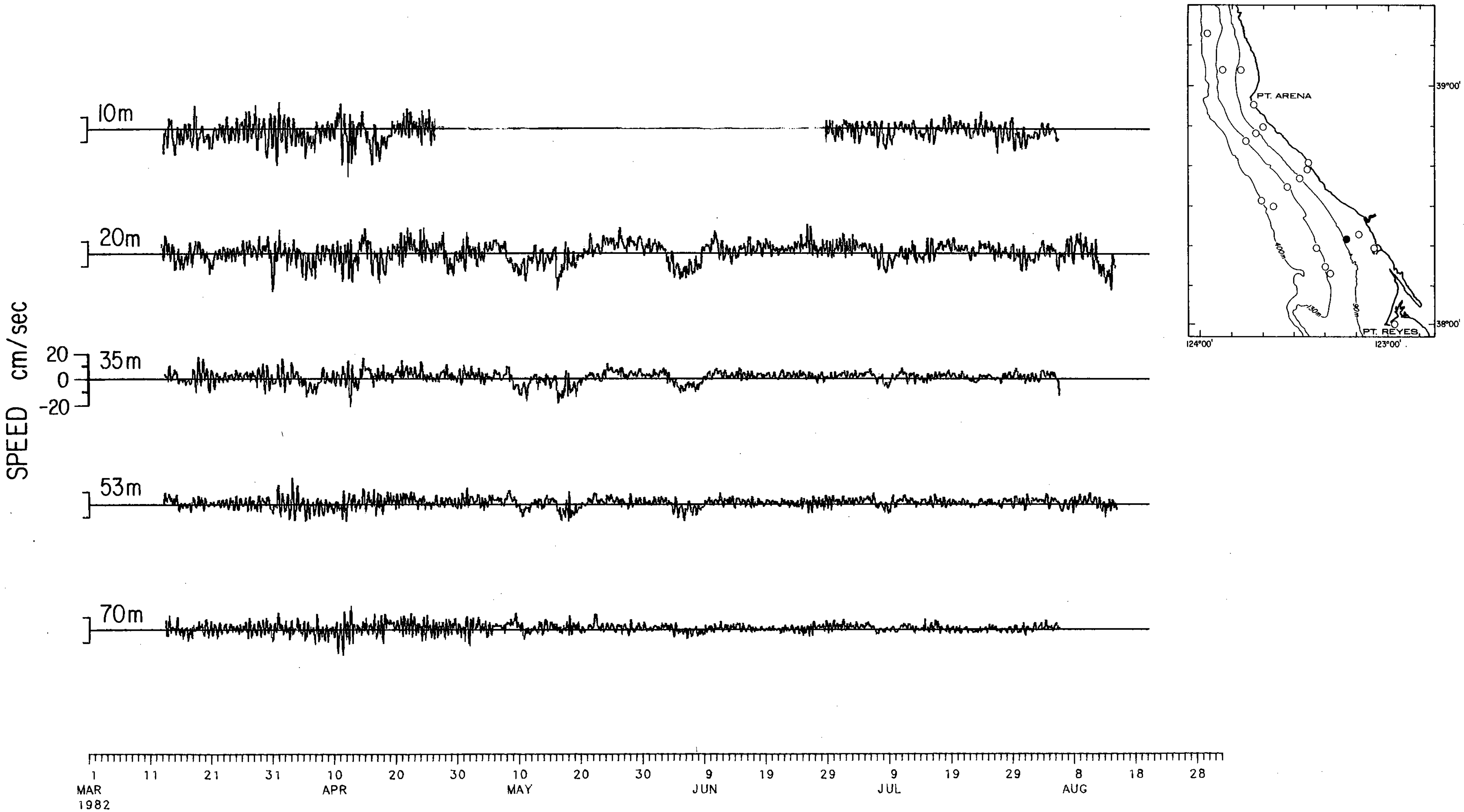

Figure 23

R4 : ALONG-SHELF CURRENT

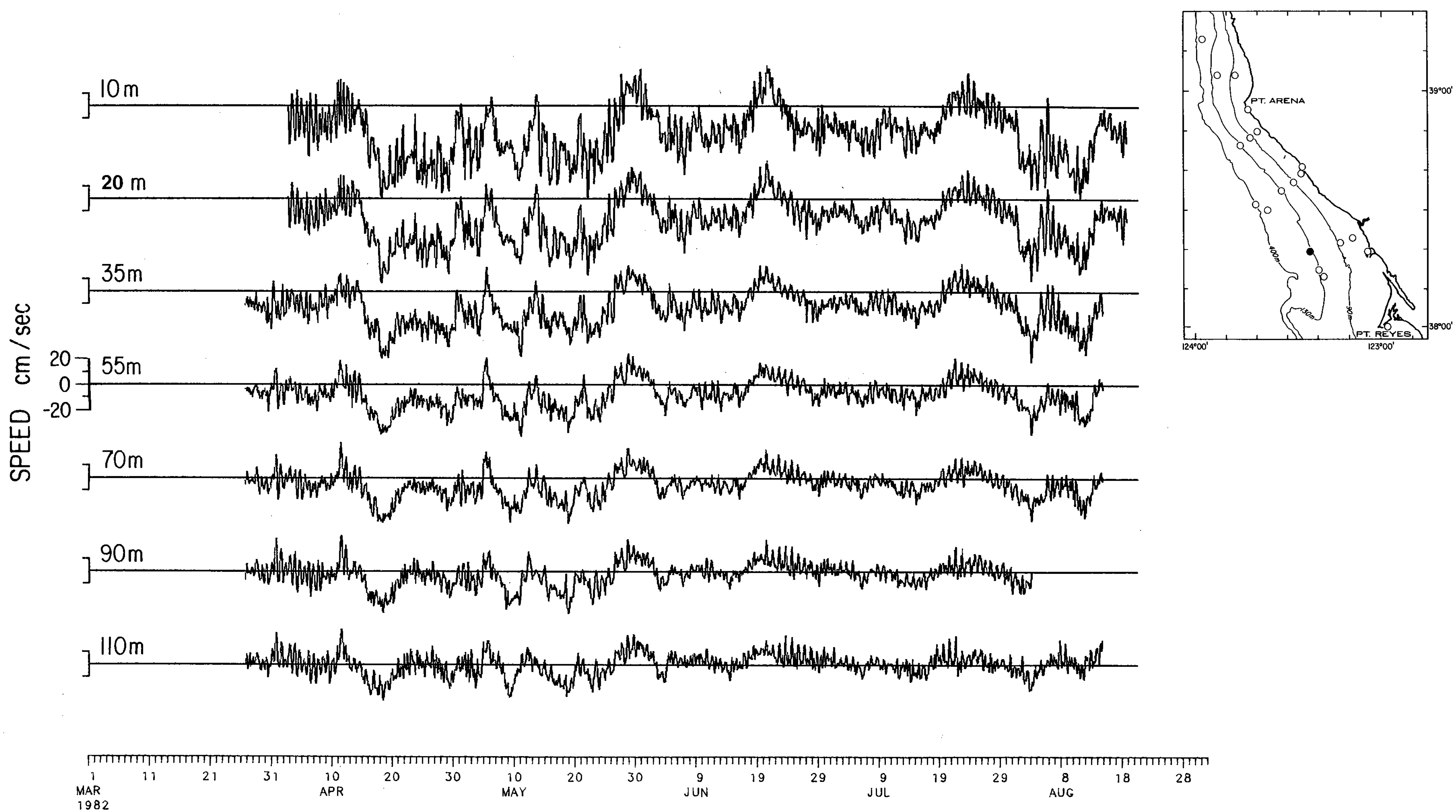

Figure 24

R4 : CROSS-SHELF CURRENT

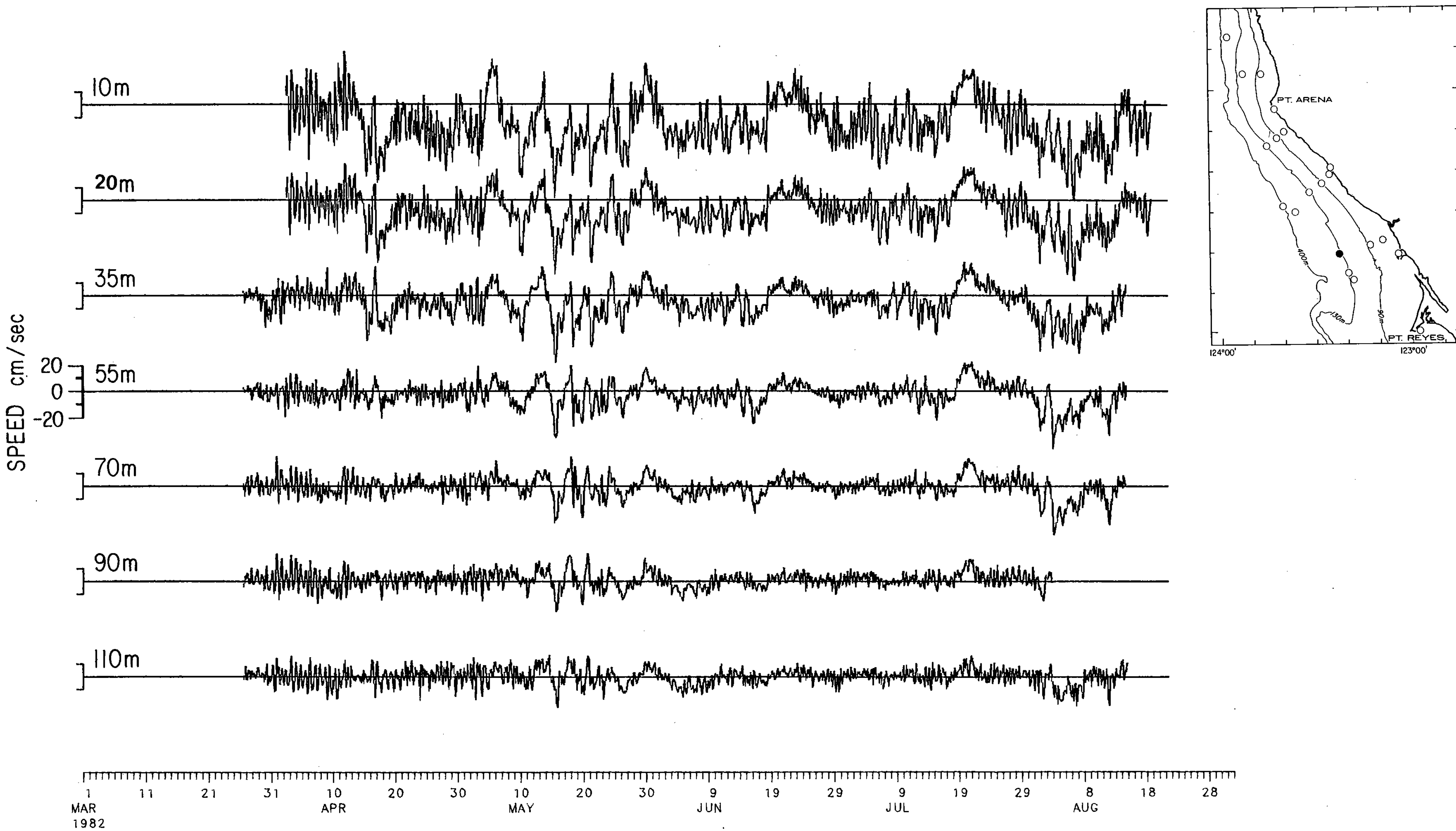

Figure 25

AN ARRAY DESCRIPTION OF THE SURFACE WIND AND NEAR-SURFACE CURRENTS

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C. A. Alessi

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Woods Hole, Massachusetts 02543

A. INTRODUCTION

The CODE-2 moored array was designed to sample the greater-than-expected horizontal variability found in the CODE-1 moored current and surface drifter observations. The resulting moored array featured three primarily cross-shelf transects of current meter moorings deployed at depths of 60 m, 90 m and 130 m located between Bodega Bay and Pt. Arena. The three transects were separated by roughly 30 km in the along-shelf direction and spanned the shelf between the very narrow inner shelf at depths of less than 60 m and the shelf-break located at depths of 150 m. Current measurements were not made shoreward of the 60 m isobath since the subtidal currents observed there in CODE-1 were quite weak. Hydrographic data, satellite sea surface temperature and surface drifter data collected in CODE-1 also suggested that the bend in the shelf geometry at Pt. Arena may reduce the continuity of the along-shelf flow around Pt. Arena. Therefore, a more lightly-instrumented cross-shelf transect was deployed north of Pt. Arena to examine the along-shelf coherence around this headland.

Preliminary analysis of the CODE-2 surface wind and current observations indicate that the moored array data does resolve the basic horizontal structures in both fields, especially between Bodega Bay and Pt. Arena. While a detailed description of the mesoscale structure of the surface wind and current fields will be presented elsewhere, we will present here time series of the surface winds and near-surface currents in the form of array plots to simply illustrate the basic horizontal structure of these two fields. The locations of the wind measurements are shown in Figure 1 and the current meter mooring locations are shown in Figure 2. The current meters were deployed at a depth of 10 m except for R2, R3 and C5 where the 10 m instruments did not work and current data from two current meters deployed at 20 m have been used instead. The vertical shear between 10 and 20 m was small enough during CODE-2 that the current pattern is similar at both levels.

Each array plot consists of 36 figures showing the vector winds or currents at time steps of 8 hours. The wind and current data shown has been subsampled every 8 hours from the basic PL64 low-pass filtered time series. The data are displayed in figure pairs with vector winds on the left-hand page and the corresponding array plot of vector currents on the right-hand (facing) page. Each array plot pair is equivalent to 12 days of data and the winds and currents are given for the common time period April 13 to July 25, 1982.

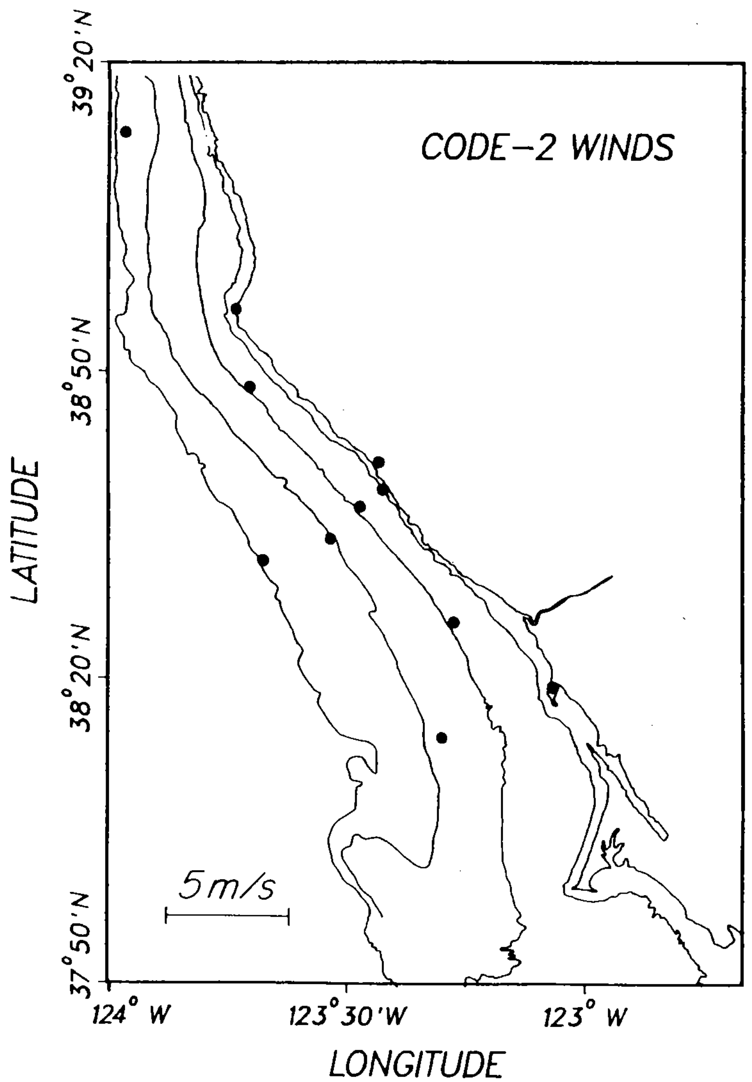


Figure 1. Locations of the CODE-2 wind measurements.

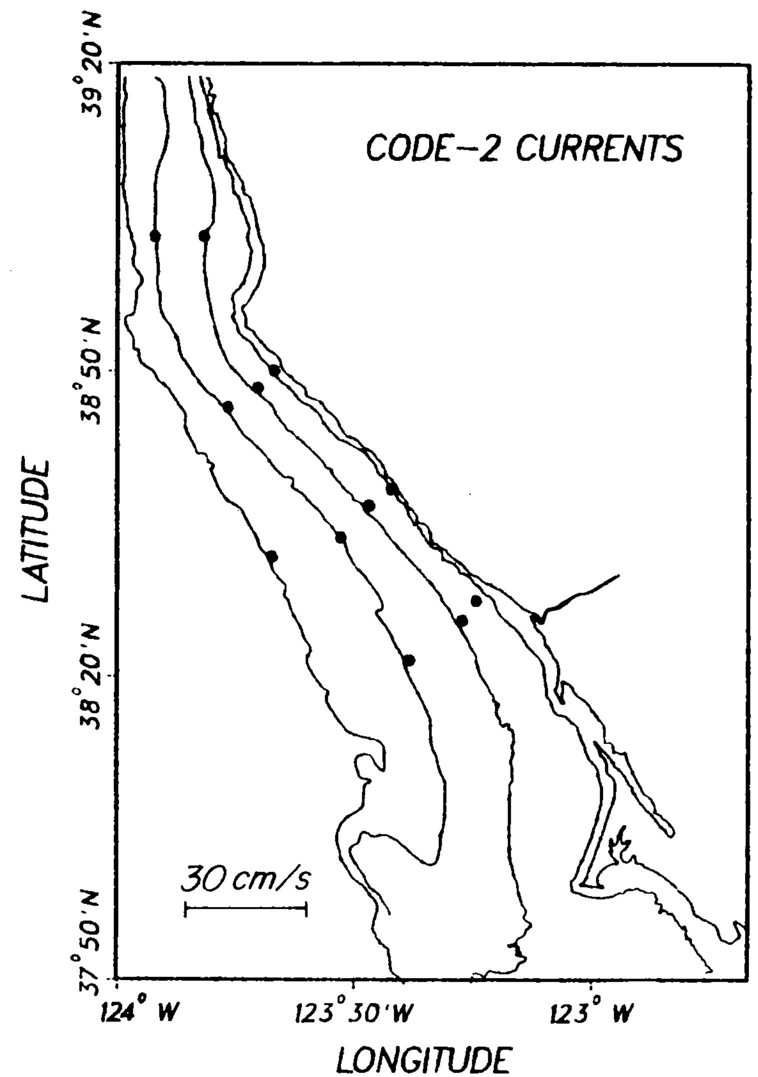


Figure 2. Locations of the current meter moorings.

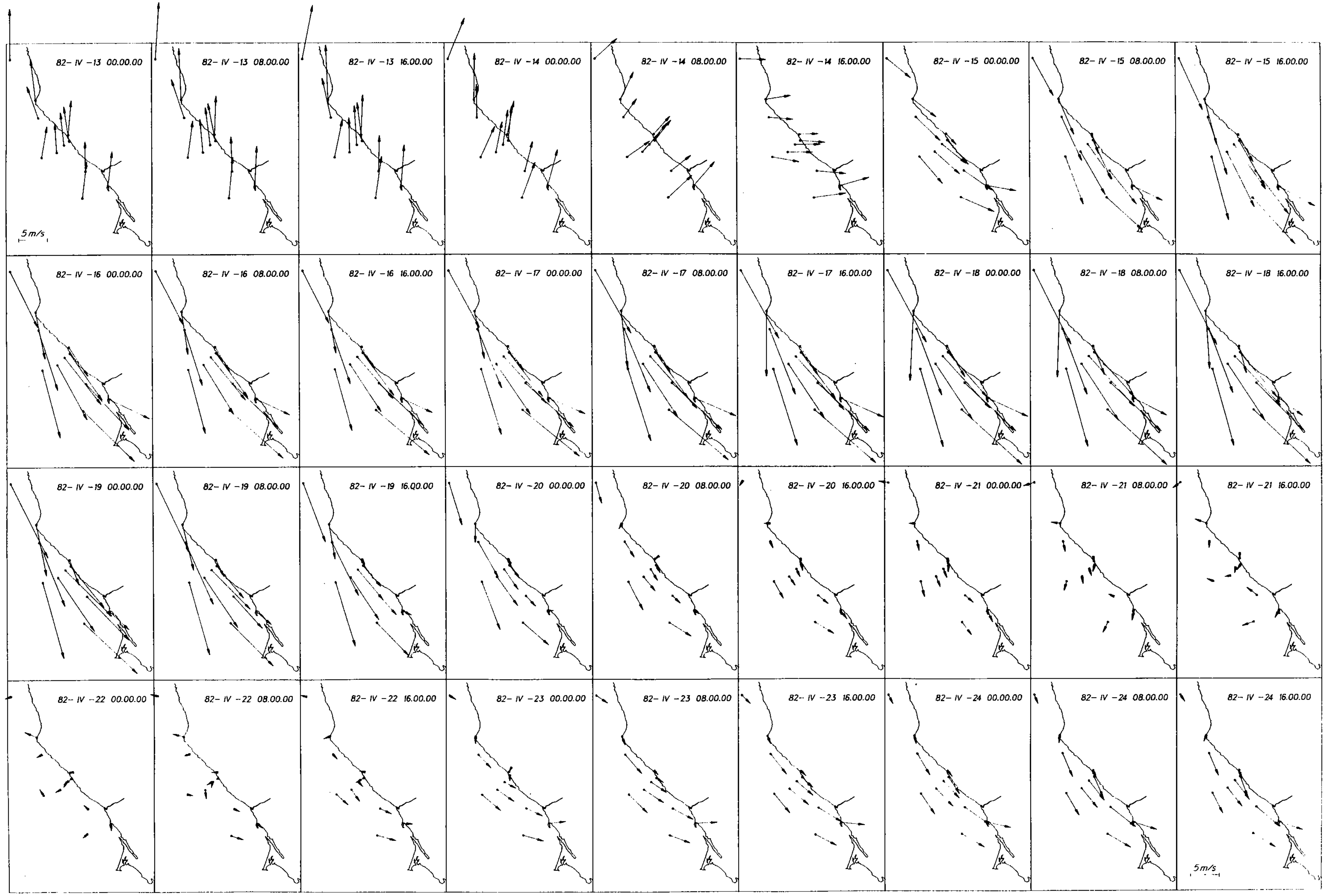
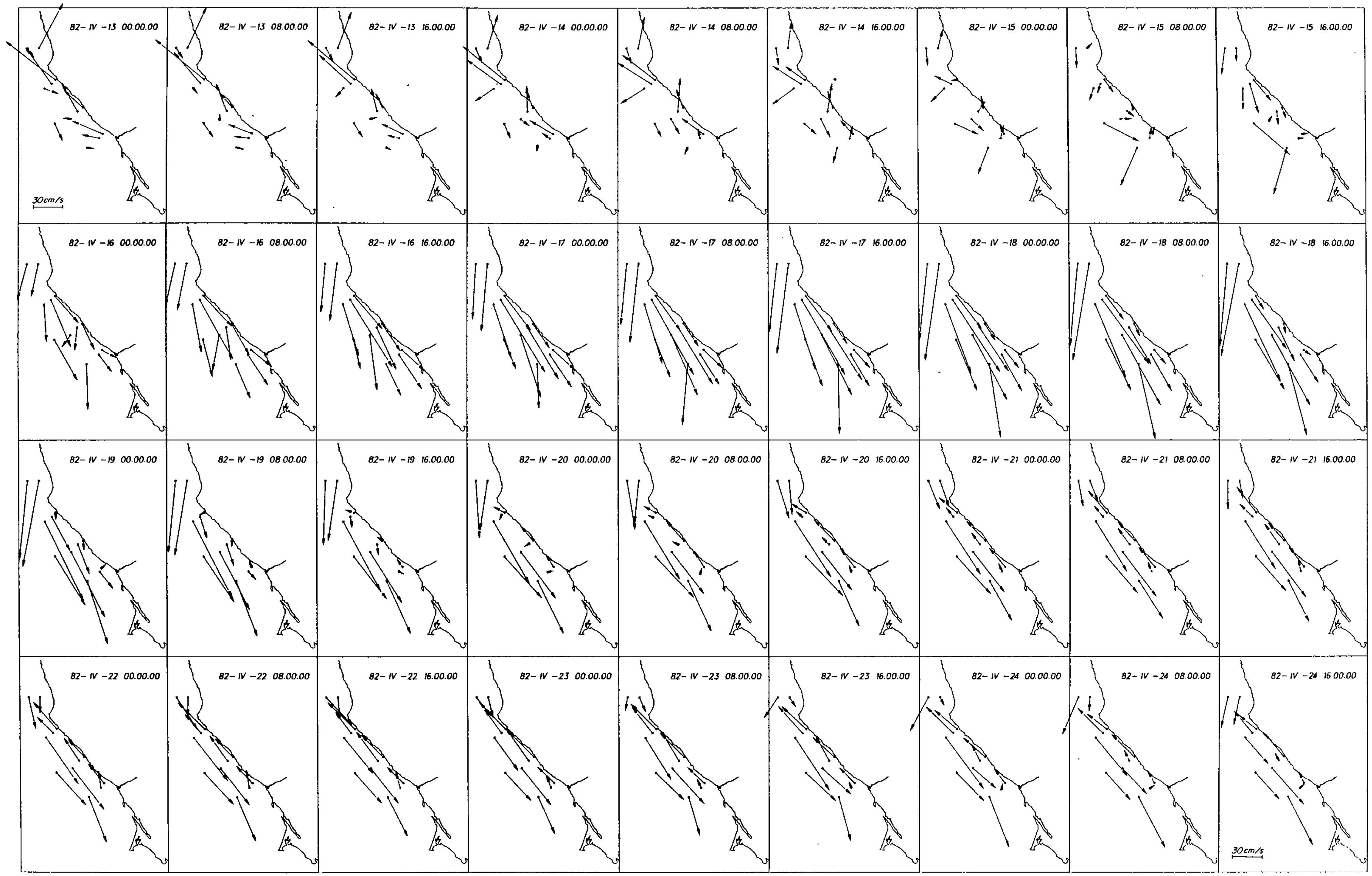

82- IV -13 00.00.00
5 m/s
82- IV -13 08.00.00
82- IV -13 16.00.00
82- IV -14 00.00.00
82- IV -14 08.00.00
82- IV -14 16.00.00
82- IV -15 00.00.00
82- IV -15 08.00.00
82- IV -15 16.00.00
82- IV -16 00.00.00
82- IV -16 08.00.00
82- IV -16 16.00.00
82- IV -17 00.00.00
82- IV -17 08.00.00
82- IV -17 16.00.00
82- IV -18 00.00.00
82- IV -18 08.00.00
82- IV -18 16.00.00
82- IV -19 00.00.00
82- IV -19 08.00.00
82- IV -19 16.00.00
82- IV -20 00.00.00
82- IV -20 08.00.00
82- IV -20 16.00.00
82- IV -21 00.00.00
82- IV -21 08.00.00
82- IV -21 16.00.00
82- IV -22 00.00.00
82- IV -22 08.00.00
82- IV -22 16.00.00
82- IV -23 00.00.00
82- IV -23 08.00.00
82- IV -23 16.00.00
82- IV -24 00.00.00
82- IV -24 08.00.00
82- IV -24 16.00.00
5 m/s

Figure 3A


82- IV -13 00.00.00
82- IV -13 08.00.00
82- IV -13 16.00.00
82- IV -14 00.00.00
82- IV -14 08.00.00
82- IV -14 16.00.00
82- IV -15 00.00.00
82- IV -15 08.00.00
82- IV -15 16.00.00
30cm/s
82- IV -16 00.00.00
82- IV -16 08.00.00
82- IV -16 16.00.00
82- IV -17 00.00.00
82- IV -17 08.00.00
82- IV -17 16.00.00
82- IV -18 00.00.00
82- IV -18 08.00.00
82- IV -18 16.00.00
82- IV -19 00.00.00
82- IV -19 08.00.00
82- IV -19 16.00.00
82- IV -20 00.00.00
82- IV -20 08.00.00
82- IV -20 16.00.00
82- IV -21 00.00.00
82- IV -21 08.00.00
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82- IV -22 16.00.00
82- IV -23 00.00.00
82- IV -23 08.00.00
82- IV -23 16.00.00
82- IV -24 00.00.00
82- IV -24 08.00.00
82- IV -24 16.00.00
30cm/s

Figure 3B

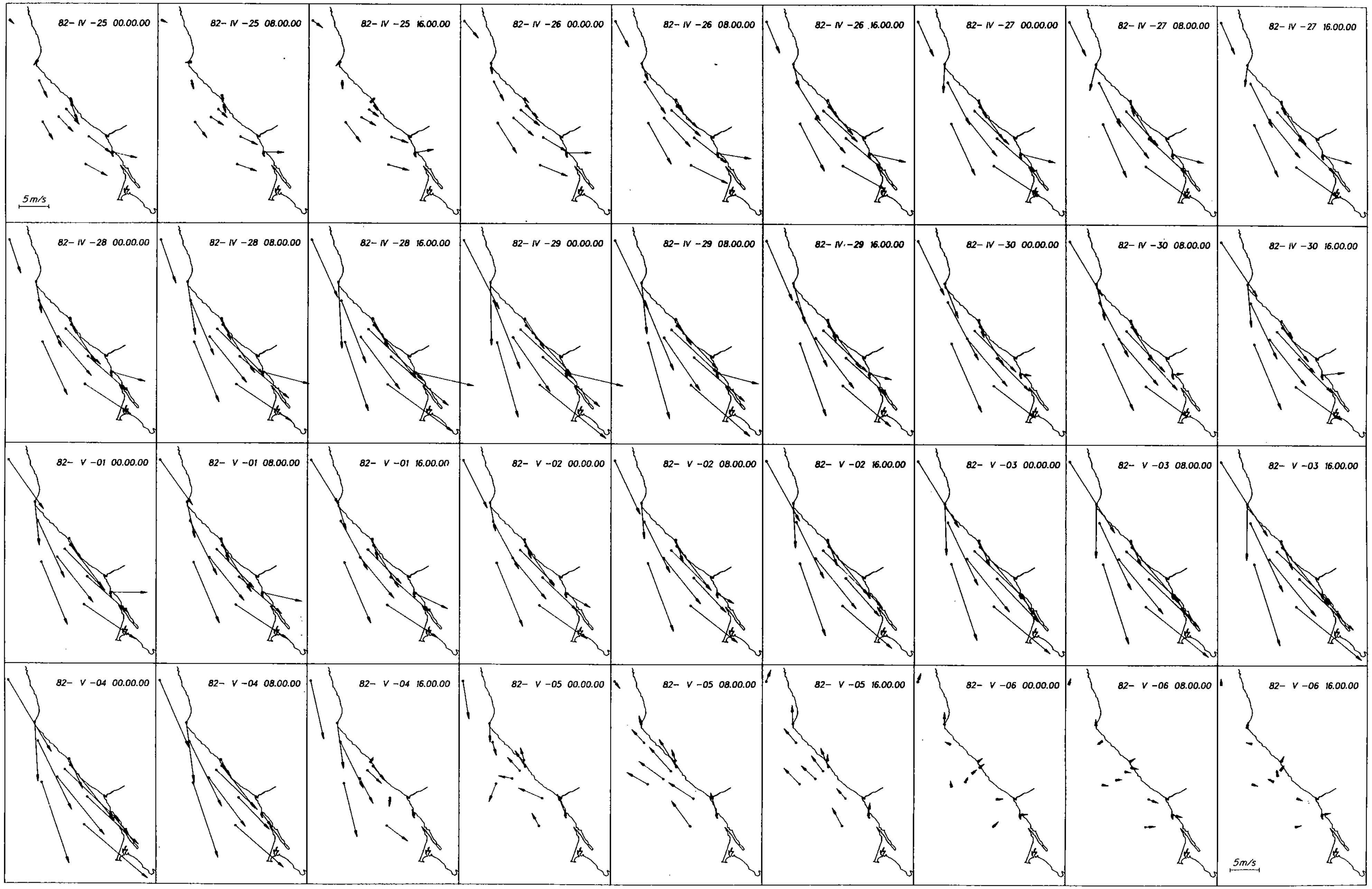

82- IV -25 00.00.00
82- IV -25 08.00.00
82- IV -25 16.00.00
82- IV -26 00.00.00
82- IV -26 08.00.00
82- IV -26 16.00.00
82- IV -27 00.00.00
82- IV -27 08.00.00
82- IV -27 16.00.00
5m/s
82- IV -28 00.00.00
82- IV -28 08.00.00
82- IV -28 16.00.00
82- IV -29 00.00.00
82- IV -29 08.00.00
82- IV -29 16.00.00
82- IV -30 00.00.00
82- IV -30 08.00.00
82- IV -30 16.00.00
82- V -01 00.00.00
82- V -01 08.00.00
82- V -01 16.00.00
82- V -02 00.00.00
82- V -02 08.00.00
82- V -02 16.00.00
82- V -03 00.00.00
82- V -03 08.00.00
82- V -03 16.00.00
82- V -04 00.00.00
82- V -04 08.00.00
82- V -04 16.00.00
82- V -05 00.00.00
82- V -05 08.00.00
82- V -05 16.00.00
82- V -06 00.00.00
82- V -06 08.00.00
82- V -06 16.00.00
5m/s

Figure 4A

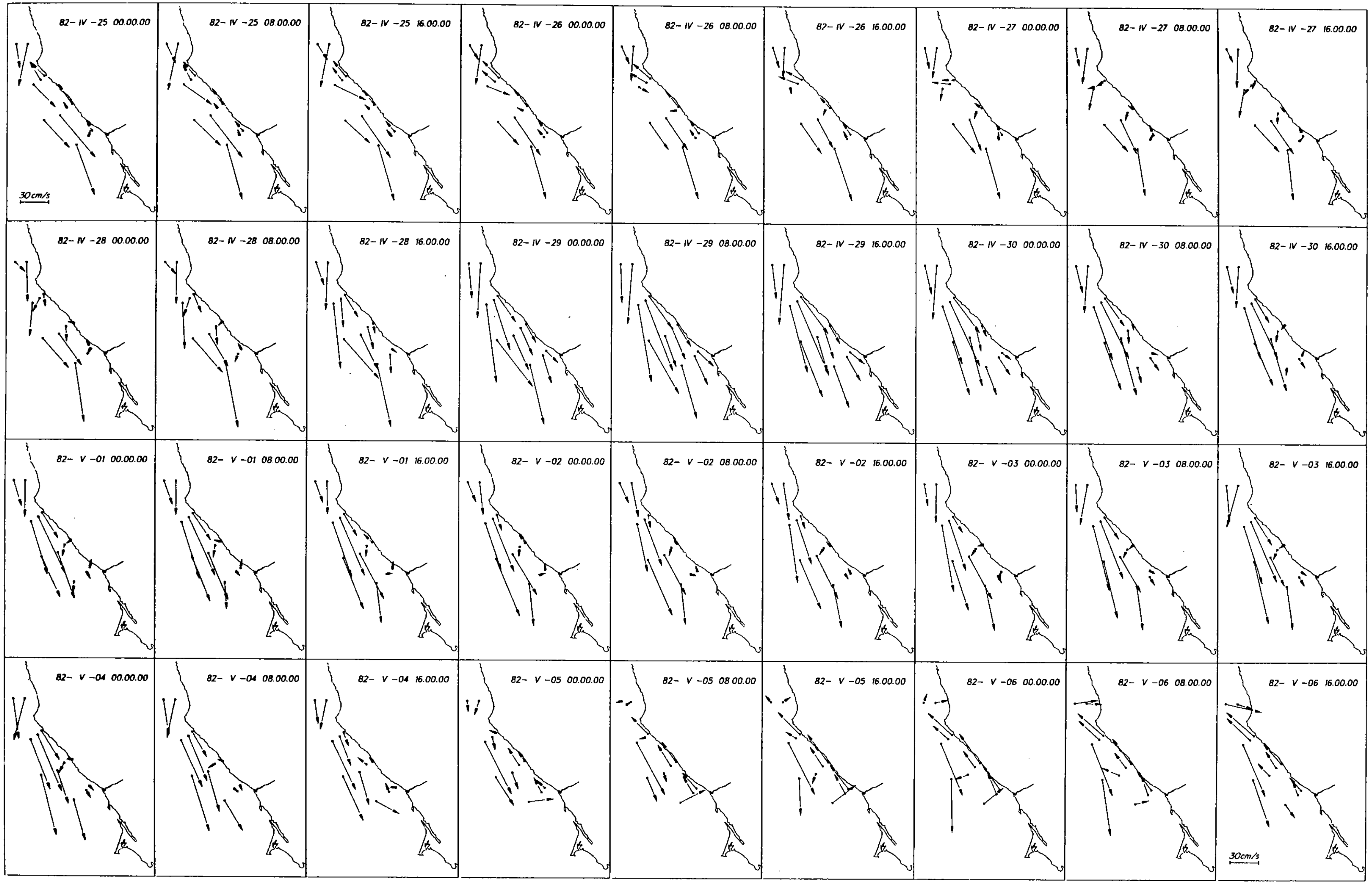

82- IV -25 00.00.00
82- IV -25 08.00.00
82- IV -25 16.00.00
82- IV -26 00.00.00
82- IV -26 08.00.00
82- IV -26 16.00.00
82- IV -27 00.00.00
82- IV -27 08.00.00
82- IV -27 16.00.00
82- IV -28 00.00.00
82- IV -28 08.00.00
82- IV -28 16.00.00
82- IV -29 00.00.00
82- IV -29 08.00.00
82- IV -29 16.00.00
82- IV -30 00.00.00
82- IV -30 08.00.00
82- IV -30 16.00.00
82- V -01 00.00.00
82- V -01 08.00.00
82- V -01 16.00.00
82- V -02 00.00.00
82- V -02 08.00.00
82- V -02 16.00.00
82- V -03 00.00.00
82- V -03 08.00.00
82- V -03 16.00.00
82- V -04 00.00.00
82- V -04 08.00.00
82- V -04 16.00.00
82- V -05 00.00.00
82- V -05 08.00.00
82- V -05 16.00.00
82- V -06 00.00.00
82- V -06 08.00.00
82- V -06 16.00.00
30cm/s

Figure 4B

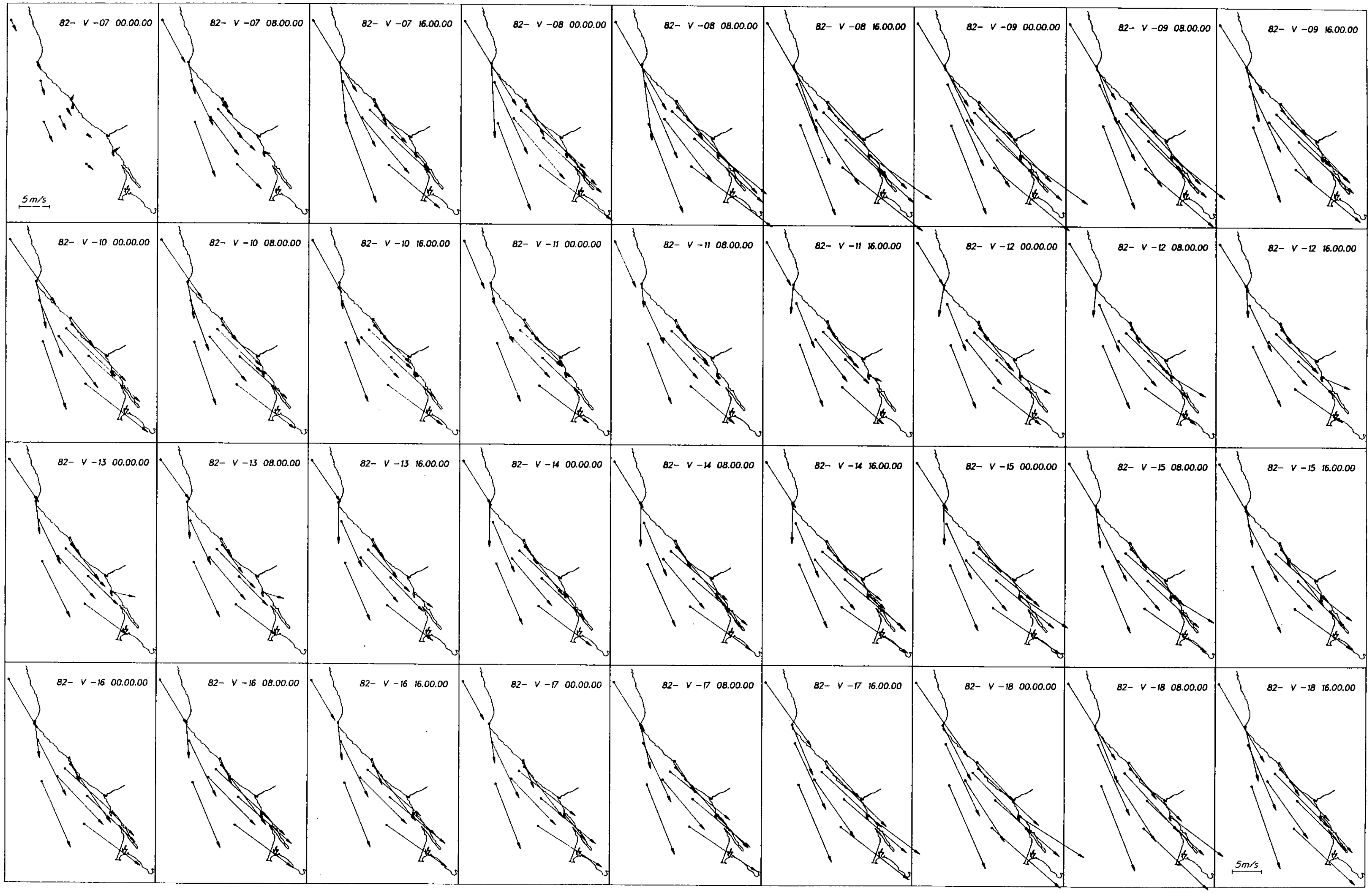

82- V -07 00.00.00
82- V -07 08.00.00
82- V -07 16.00.00
82- V -08 00.00.00
82- V -08 08.00.00
82- V -08 16.00.00
82- V -09 00.00.00
82- V -09 08.00.00
82- V -09 16.00.00
5 m/s
82- V -10 00.00.00
82- V -10 08.00.00
82- V -10 16.00.00
82- V -11 00.00.00
82- V -11 08.00.00
82- V -11 16.00.00
82- V -12 00.00.00
82- V -12 08.00.00
82- V -12 16.00.00
82- V -13 00.00.00
82- V -13 08.00.00
82- V -13 16.00.00
82- V -14 00.00.00
82- V -14 08.00.00
82- V -14 16.00.00
82- V -15 00.00.00
82- V -15 08.00.00
82- V -15 16.00.00
82- V -16 00.00.00
82- V -16 08.00.00
82- V -16 16.00.00
82- V -17 00.00.00
82- V -17 08.00.00
82- V -17 16.00.00
82- V -18 00.00.00
82- V -18 08.00.00
82- V -18 16.00.00
5m/s

Figure 5A

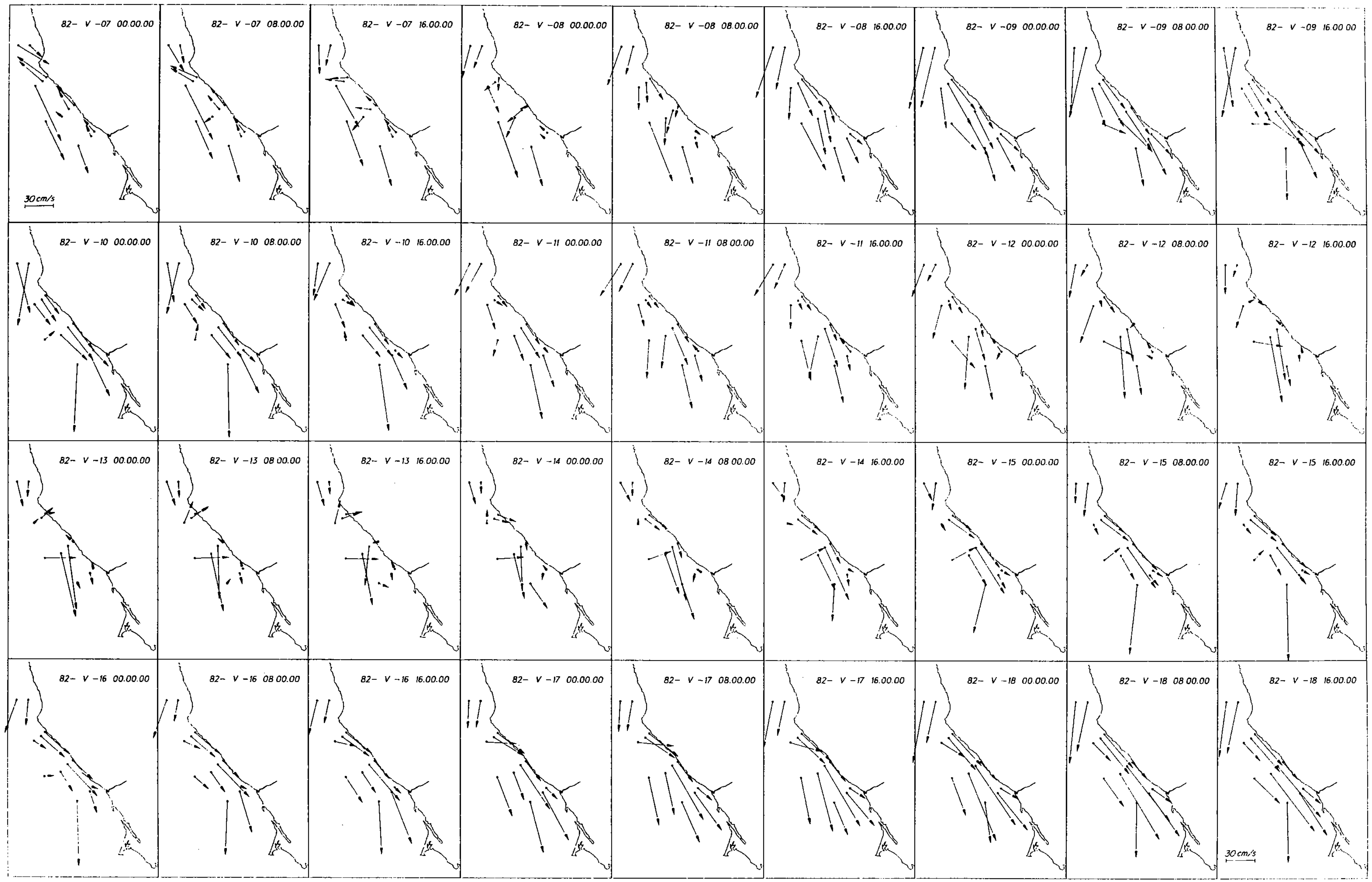

82- V -07 00.00.00
82- V -07 08.00.00
82- V -07 16.00.00
82- V -08 00.00.00
82- V -08 08.00.00
82- V -08 16.00.00
82- V -09 00.00.00
82- V -09 08.00.00
82- V -09 16.00.00
30 cm/s
82- V -10 00.00.00
82- V -10 08.00.00
82- V -10 16.00.00
82- V -11 00.00.00
82- V -11 08.00.00
82- V -11 16.00.00
82- V -12 00.00.00
82- V -12 08.00.00
82- V -12 16.00.00
82- V -13 00.00.00
82- V -13 08.00.00
82- V -13 16.00.00
82- V -14 00.00.00
82- V -14 08.00.00
82- V -14 16.00.00
82- V -15 00.00.00
82- V -15 08.00.00
82- V -15 16.00.00
82- V -16 00.00.00
82- V -16 08.00.00
82- V -16 16.00.00
82- V -17 00.00.00
82- V -17 08.00.00
82- V -17 16.00.00
82- V -18 00.00.00
82- V -18 08.00.00
82- V -18 16.00.00
30 cm/s

Figure 5B

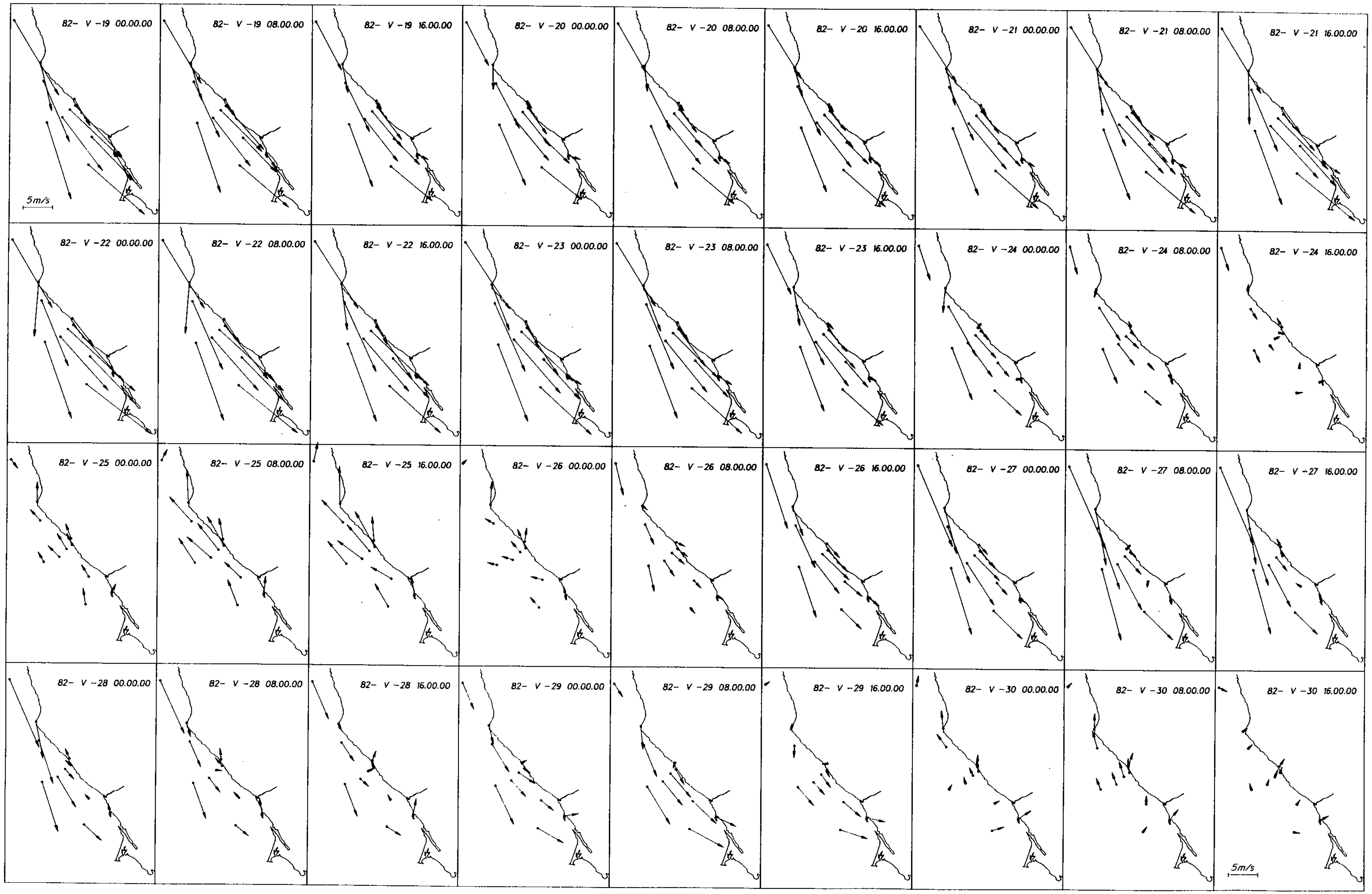

82- V -19 00.00.00
82- V -19 08.00.00
82- V -19 16.00.00
82- V -20 00.00.00
82- V -20 08.00.00
82- V -20 16.00.00
82- V -21 00.00.00
82- V -21 08.00.00
82- V -21 16.00.00
5m/s
82- V -22 00.00.00
82- V -22 08.00.00
82- V -22 16.00.00
82- V -23 00.00.00
82- V -23 08.00.00
82- V -23 16.00.00
82- V -24 00.00.00
82- V -24 08.00.00
82- V -24 16.00.00
82- V -25 00.00.00
82- V -25 08.00.00
82- V -25 16.00.00
82- V -26 00.00.00
82- V -26 08.00.00
82- V -26 16.00.00
82- V -27 00.00.00
82- V -27 08.00.00
82- V -27 16.00.00
82- V -28 00.00.00
82- V -28 08.00.00
82- V -28 16.00.00
82- V -29 00.00.00
82- V -29 08.00.00
82- V -29 16.00.00
82- V -30 00.00.00
82- V -30 08.00.00
82- V -30 16.00.00
5m/s

Figure 6A

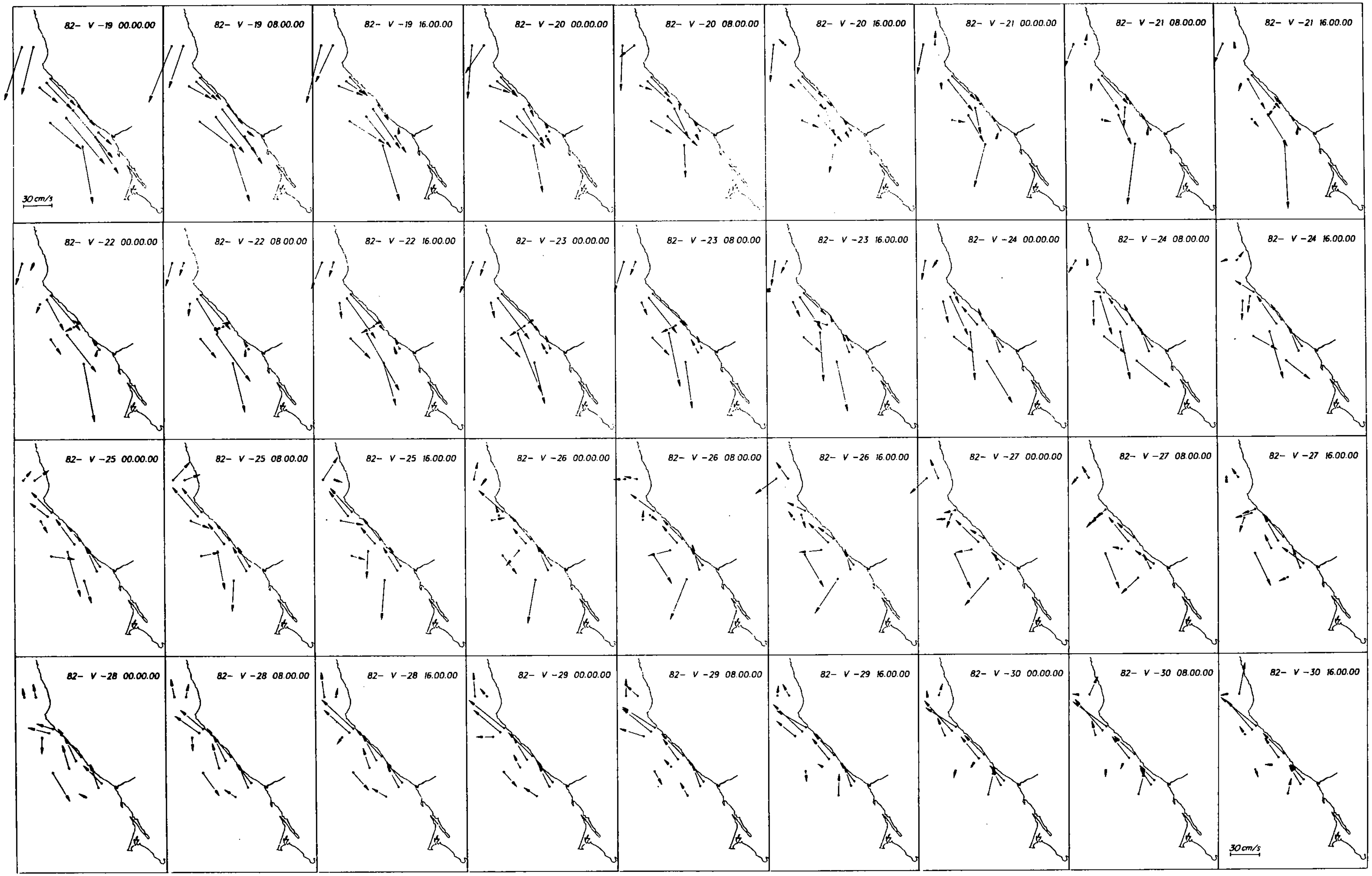

82- V -19 00.00.00
82- V -19 08.00.00
82- V -19 16.00.00
82- V -20 00.00.00
82- V -20 08.00.00
82- V -20 16.00.00
82- V -21 00.00.00
82- V -21 08.00.00
82- V -21 16.00.00
82- V -22 00.00.00
82- V -22 08.00.00
82- V -22 16.00.00
82- V -23 00.00.00
82- V -23 08.00.00
82- V -23 16.00.00
82- V -24 00.00.00
82- V -24 08.00.00
82- V -24 16.00.00
82- V -25 00.00.00
82- V -25 08.00.00
82- V -25 16.00.00
82- V -26 00.00.00
82- V -26 08.00.00
82- V -26 16.00.00
82- V -27 00.00.00
82- V -27 08.00.00
82- V -27 16.00.00
82- V -28 00.00.00
82- V -28 08.00.00
82- V -28 16.00.00
82- V -29 00.00.00
82- V -29 08.00.00
82- V -29 16.00.00
82- V -30 00.00.00
82- V -30 08.00.00
82- V -30 16.00.00
30 cm/s

Figure 6B

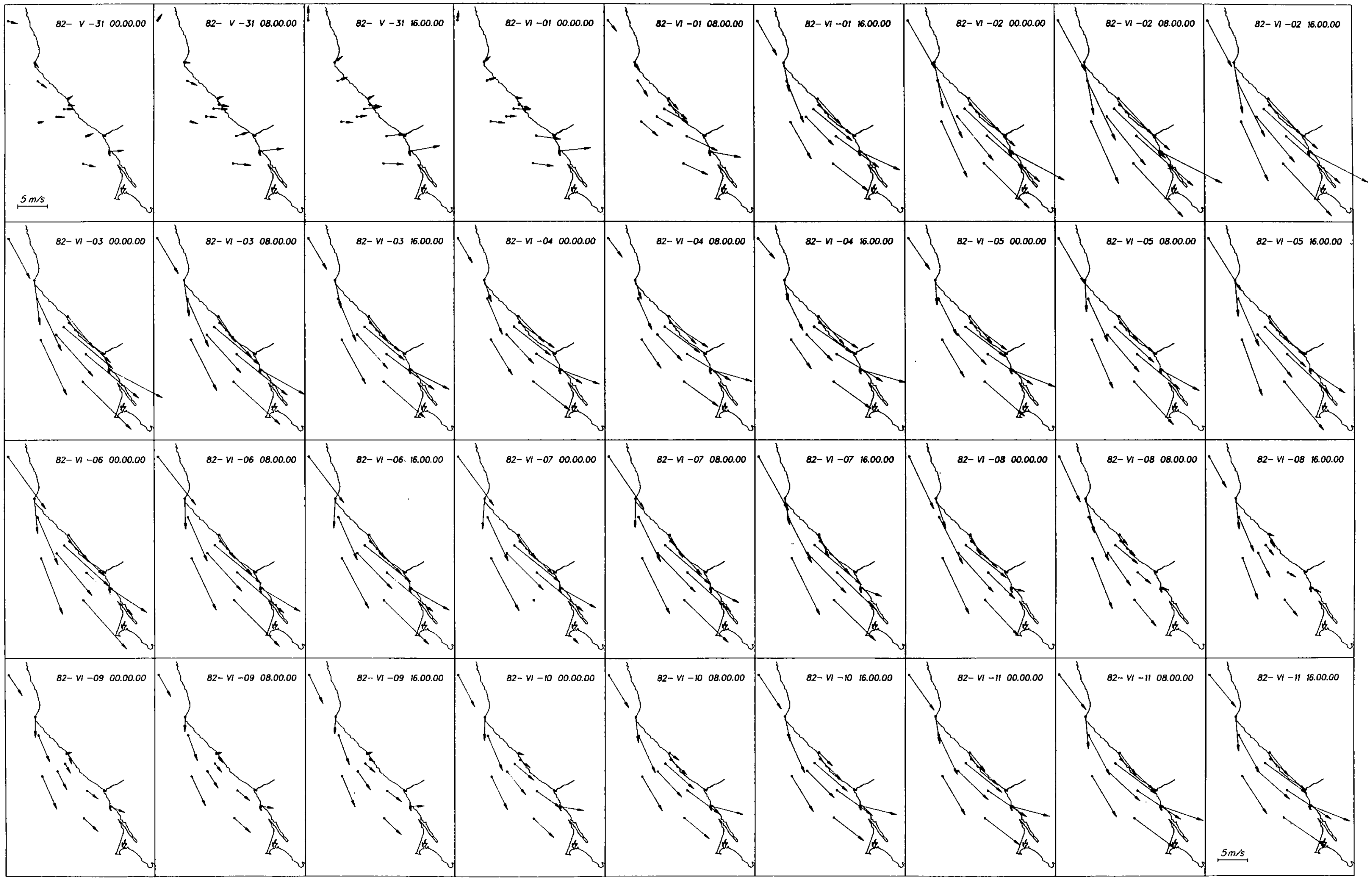
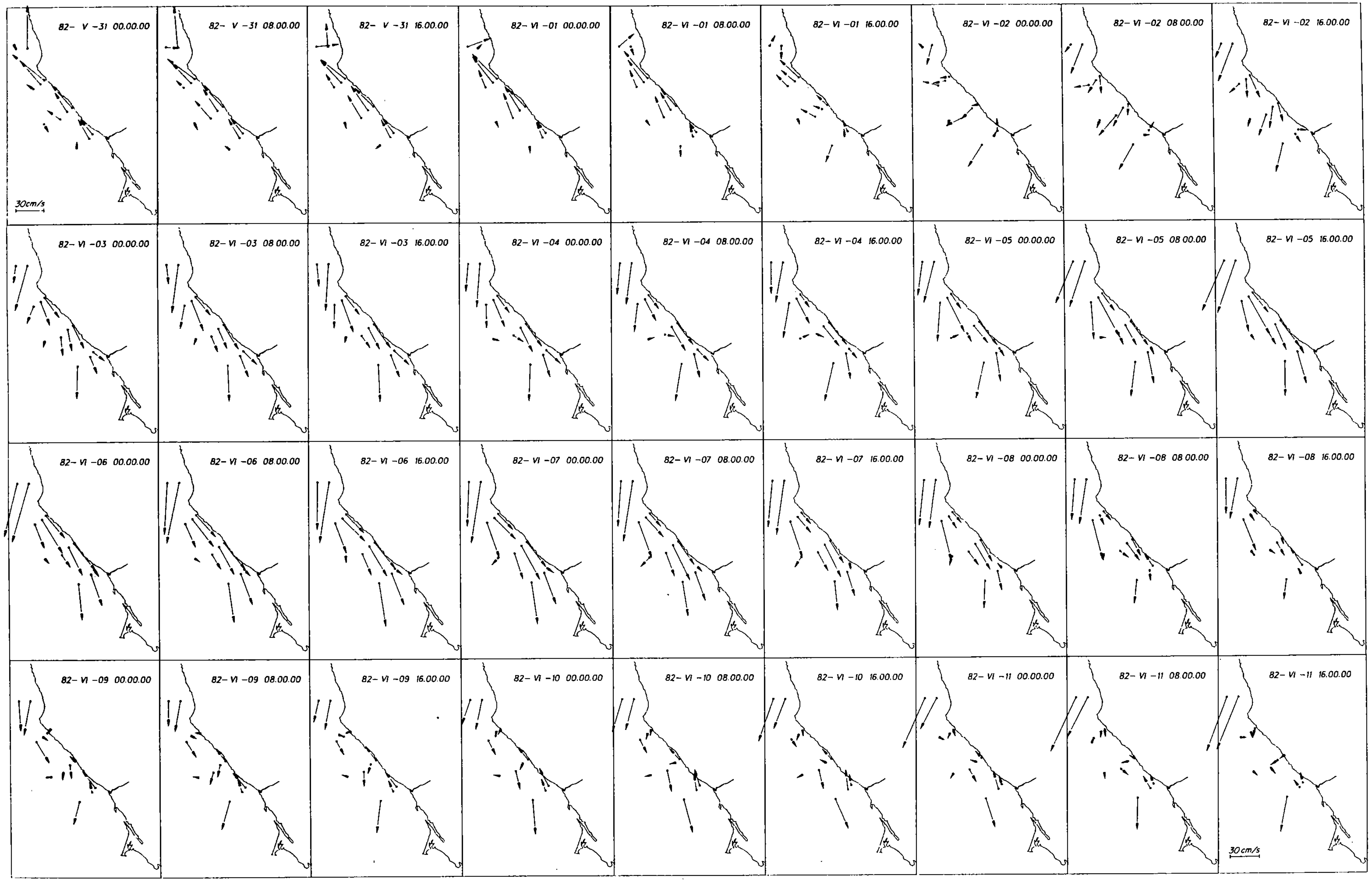

82- V -31 00.00.00
82- V -31 08.00.00
82- V -31 16.00.00
82- VI -01 00.00.00
82- VI -01 08.00.00
82- VI -01 16.00.00
82- VI -02 00.00.00
82- VI -02 08.00.00
82- VI -02 16.00.00
82- VI -03 00.00.00
82- VI -03 08.00.00
82- VI -03 16.00.00
82- VI -04 00.00.00
82- VI -04 08.00.00
82- VI -04 16.00.00
82- VI -05 00.00.00
82- VI -05 08.00.00
82- VI -05 16.00.00
82- VI -06 00.00.00
82- VI -06 08.00.00
82- VI -06 16.00.00
82- VI -07 00.00.00
82- VI -07 08.00.00
82- VI -07 16.00.00
82- VI -08 00.00.00
82- VI -08 08.00.00
82- VI -08 16.00.00
82- VI -09 00.00.00
82- VI -09 08.00.00
82- VI -09 16.00.00
82- VI -10 00.00.00
82- VI -10 08.00.00
82- VI -10 16.00.00
82- VI -11 00.00.00
82- VI -11 08.00.00
82- VI -11 16.00.00
5 m/s
5m/s

Figure 7A



82- V -31 00.00.00
82- V -31 08.00.00
82- V -31 16.00.00
82- VI -01 00.00.00
82- VI -01 08.00.00
82- VI -01 16.00.00
82- VI -02 00.00.00
82- VI -02 08 00.00
82- VI -02 16.00.00
30cm/s
82- VI -03 00.00.00
82- VI -03 08 00.00
82- VI -03 16.00.00
82- VI -04 00.00.00
82- VI -04 08.00.00
82- VI -04 16.00.00
82- VI -05 00.00.00
82- VI -05 08 00.00
82- VI -05 16.00.00
82- VI -06 00.00.00
82- VI -06 08.00.00
82- VI -06 16.00.00
82- VI -07 00.00.00
82- VI -07 08.00.00
82- VI -07 16.00.00
82- VI -08 00.00.00
82- VI -08 08 00.00
82- VI -08 16.00.00
82- VI -09 00.00.00
82- VI -09 08.00.00
82- VI -09 16.00.00
82- VI -10 00.00.00
82- VI -10 08.00.00
82- VI -10 16.00.00
82- VI -11 00.00.00
82- VI -11 08.00.00
82- VI -11 16.00.00
30cm/s

Figure 7B

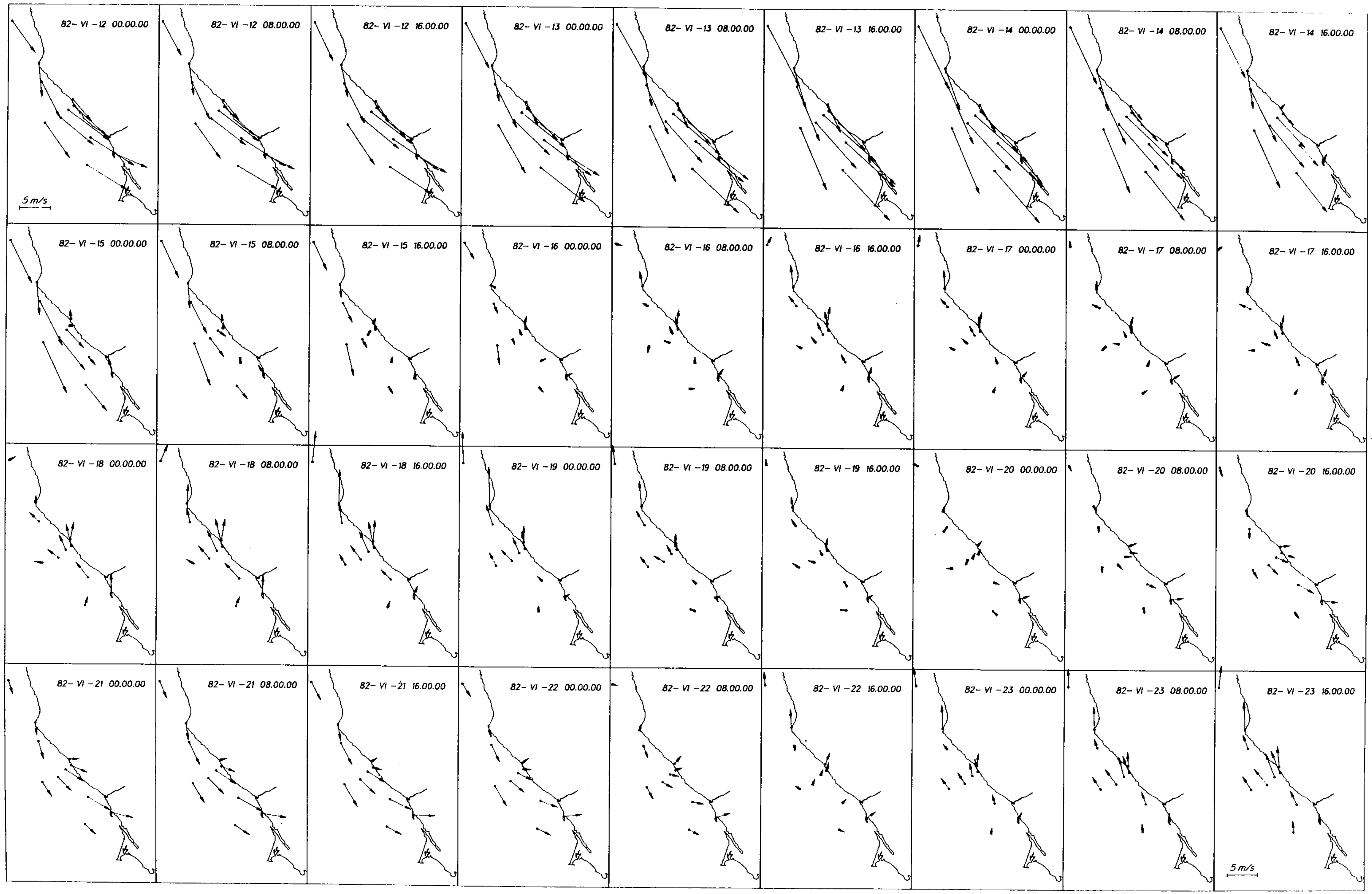
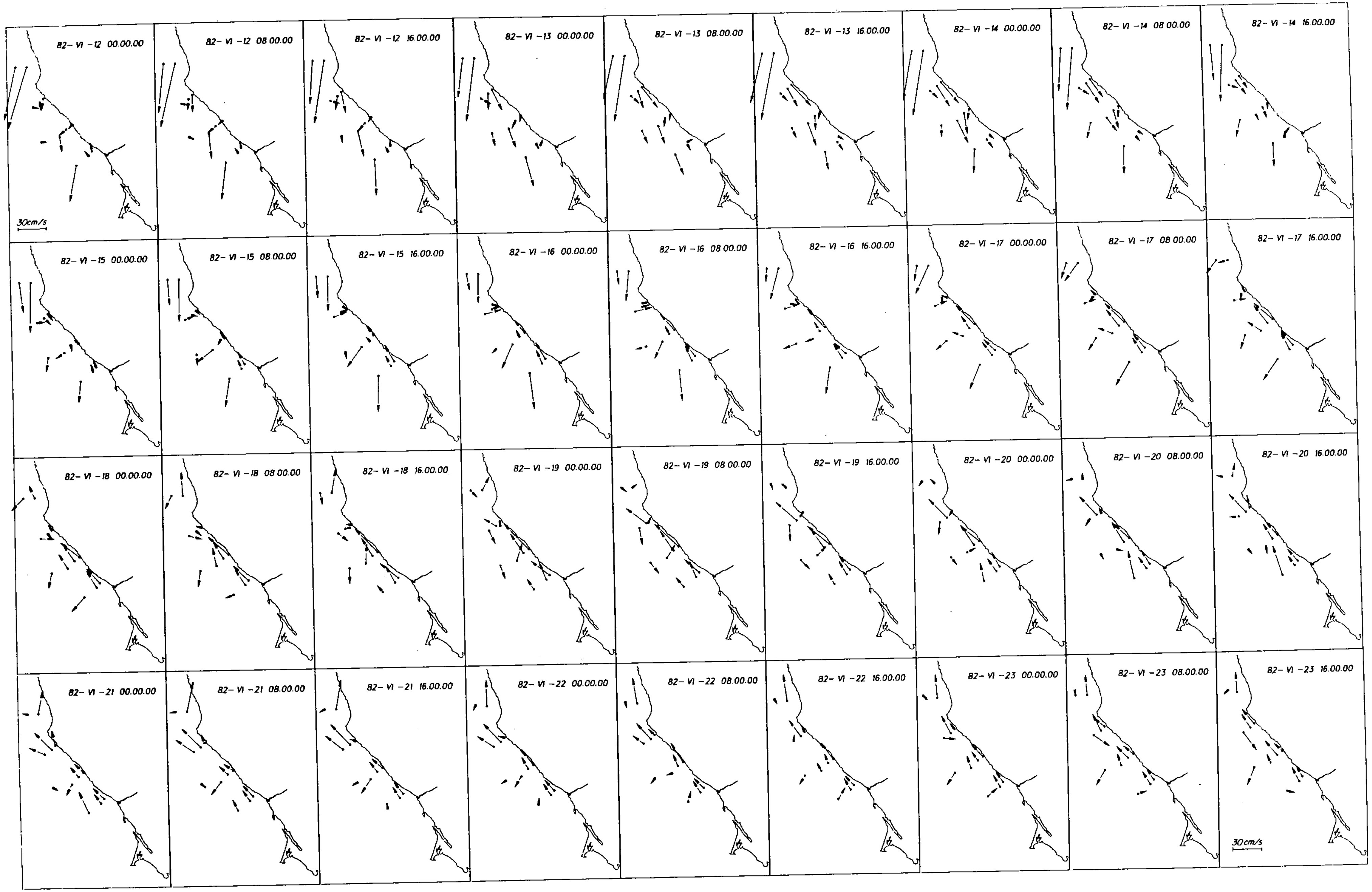

82- VI -12 00.00.00
82- VI -12 08.00.00
82- VI -12 16.00.00
82- VI -13 00.00.00
82- VI -13 08.00.00
82- VI -13 16.00.00
82- VI -14 00.00.00
82- VI -14 08.00.00
82- VI -14 16.00.00
82- VI -15 00.00.00
82- VI -15 08.00.00
82- VI -15 16.00.00
82- VI -16 00.00.00
82- VI -16 08.00.00
82- VI -16 16.00.00
82- VI -17 00.00.00
82- VI -17 08.00.00
82- VI -17 16.00.00
82- VI -18 00.00.00
82- VI -18 08.00.00
82- VI -18 16.00.00
82- VI -19 00.00.00
82- VI -19 08.00.00
82- VI -19 16.00.00
82- VI -20 00.00.00
82- VI -20 08.00.00
82- VI -20 16.00.00
82- VI -21 00.00.00
82- VI -21 08.00.00
82- VI -21 16.00.00
82- VI -22 00.00.00
82- VI -22 08.00.00
82- VI -22 16.00.00
82- VI -23 00.00.00
82- VI -23 08.00.00
82- VI -23 16.00.00
5 m/s
5 m/s

Figure 8A



82- VI -12 00.00.00
82- VI -12 08.00.00
82- VI -12 16.00.00
82- VI -13 00.00.00
82- VI -13 08.00.00
82- VI -13 16.00.00
82- VI -14 00.00.00
82- VI -14 08.00.00
82- VI -14 16.00.00
30cm/s
82- VI -15 00.00.00
82- VI -15 08.00.00
82- VI -15 16.00.00
82- VI -16 00.00.00
82- VI -16 08.00.00
82- VI -16 16.00.00
82- VI -17 00.00.00
82- VI -17 08.00.00
82- VI -17 16.00.00
82- VI -18 00.00.00
82- VI -18 08.00.00
82- VI -18 16.00.00
82- VI -19 00.00.00
82- VI -19 08.00.00
82- VI -19 16.00.00
82- VI -20 00.00.00
82- VI -20 08.00.00
82- VI -20 16.00.00
82- VI -21 00.00.00
82- VI -21 08.00.00
82- VI -21 16.00.00
82- VI -22 00.00.00
82- VI -22 08.00.00
82- VI -22 16.00.00
82- VI -23 00.00.00
82- VI -23 08.00.00
82- VI -23 16.00.00
30cm/s

Figure 8B

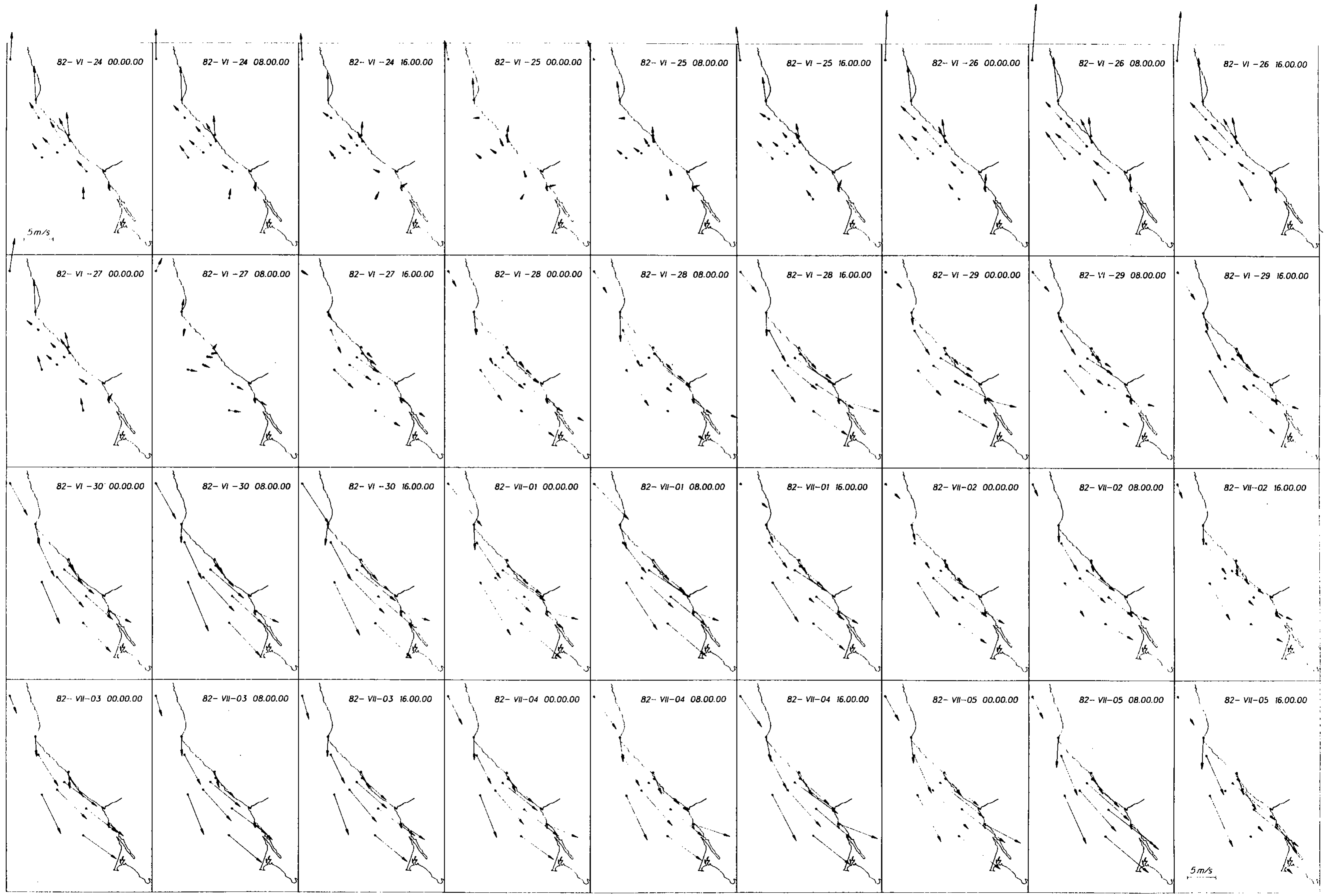

82- VI -24 00.00.00
82- VI -24 08.00.00
82- VI -24 16.00.00
82- VI -25 00.00.00
82- VI -25 08.00.00
82- VI -25 16.00.00
82- VI -26 00.00.00
82- VI -26 08.00.00
82- VI -26 16.00.00
5m/s
82- VI -27 00.00.00
82- VI -27 08.00.00
82- VI -27 16.00.00
82- VI -28 00.00.00
82- VI -28 08.00.00
82- VI -28 16.00.00
82- VI -29 00.00.00
82- VI -29 08.00.00
82- VI -29 16.00.00
82- VI -30 00.00.00
82- VI -30 08.00.00
82- VI -30 16.00.00
82- VII-01 00.00.00
82- VII-01 08.00.00
82- VII-01 16.00.00
82- VII-02 00.00.00
82- VII-02 08.00.00
82- VII-02 16.00.00
82- VII-03 00.00.00
82- VII-03 08.00.00
82- VII-03 16.00.00
82- VII-04 00.00.00
82- VII-04 08.00.00
82- VII-04 16.00.00
82- VII-05 00.00.00
82- VII-05 08.00.00
82- VII-05 16.00.00
5m/s

Figure 9A

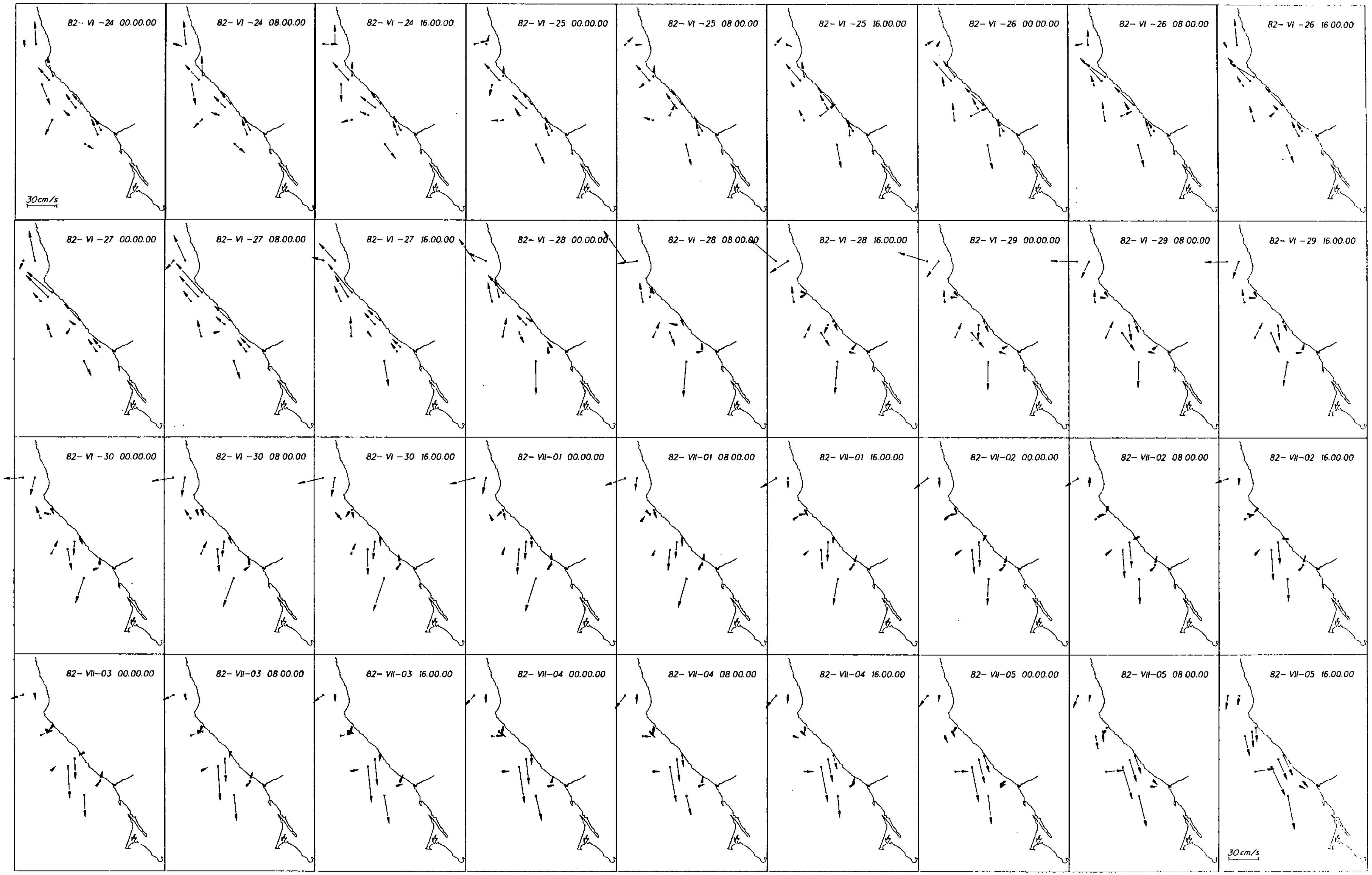

82- VI -24 00.00.00
82- VI -24 08.00.00
82- VI -24 16.00.00
82- VI -25 00.00.00
82- VI -25 08.00.00
82- VI -25 16.00.00
82- VI -26 00.00.00
82- VI -26 08.00.00
82- VI -26 16.00.00
82- VI -27 00.00.00
82- VI -27 08.00.00
82- VI -27 16.00.00
82- VI -28 00.00.00
82- VI -28 08.00.00
82- VI -28 16.00.00
82- VI -29 00.00.00
82- VI -29 08.00.00
82- VI -29 16.00.00
82- VI -30 00.00.00
82- VI -30 08.00.00
82- VI -30 16.00.00
82- VII-01 00.00.00
82- VII-01 08.00.00
82- VII-01 16.00.00
82- VII-02 00.00.00
82- VII-02 08.00.00
82- VII-02 16.00.00
82- VII-03 00.00.00
82- VII-03 08.00.00
82- VII-03 16.00.00
82- VII-04 00.00.00
82- VII-04 08.00.00
82- VII-04 16.00.00
82- VII-05 00.00.00
82- VII-05 08.00.00
82- VII-05 16.00.00
30cm/s

Figure 9B

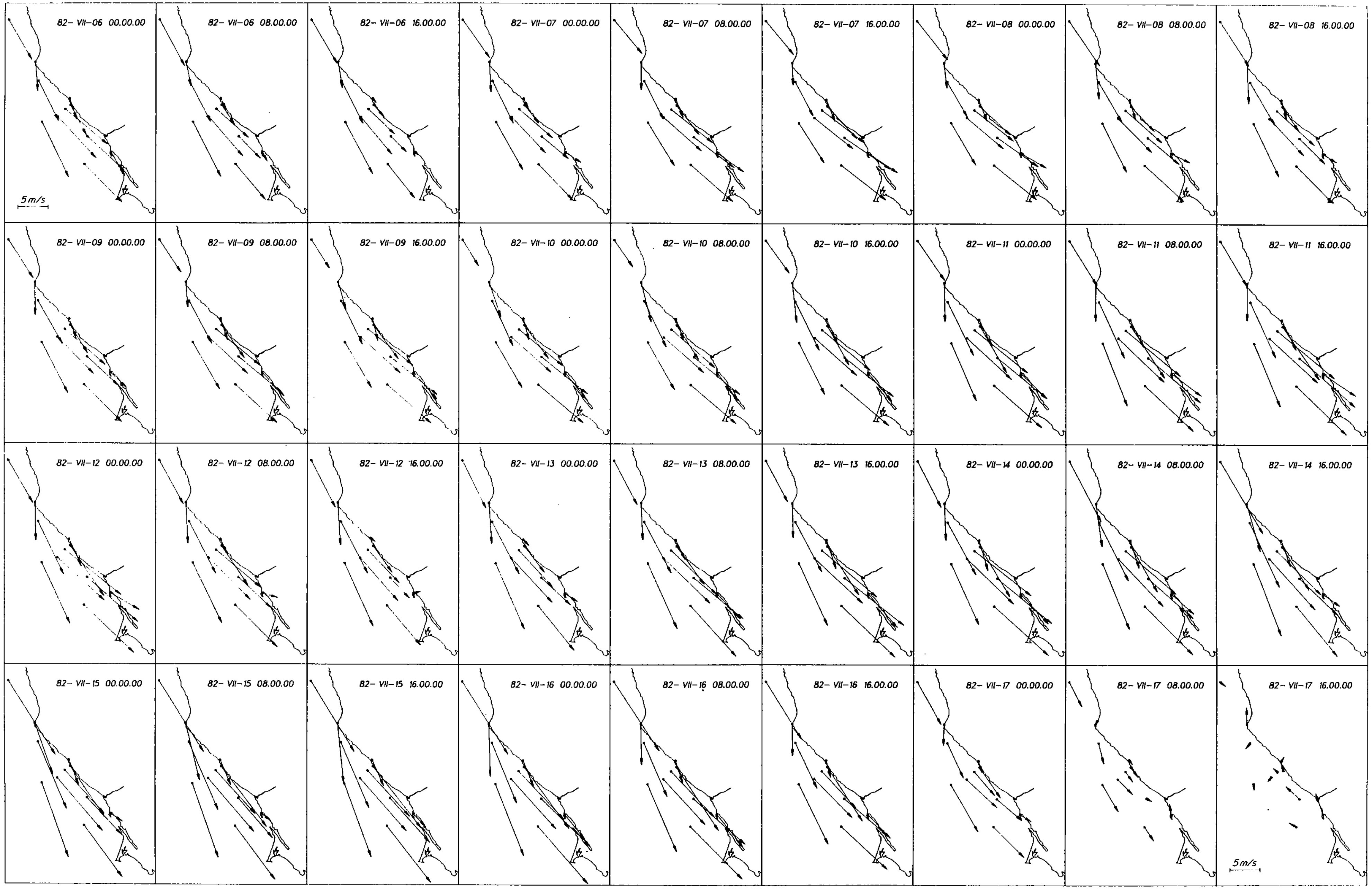

82- VII-06 00.00.00
82- VII-06 08.00.00
82- VII-06 16.00.00
82- VII-07 00.00.00
82- VII-07 08.00.00
82- VII-07 16.00.00
82- VII-08 00.00.00
82- VII-08 08.00.00
82- VII-08 16.00.00
82- VII-09 00.00.00
82- VII-09 08.00.00
82- VII-09 16.00.00
82- VII-10 00.00.00
82- VII-10 08.00.00
82- VII-10 16.00.00
82- VII-11 00.00.00
82- VII-11 08.00.00
82- VII-11 16.00.00
82- VII-12 00.00.00
82- VII-12 08.00.00
82- VII-12 16.00.00
82- VII-13 00.00.00
82- VII-13 08.00.00
82- VII-13 16.00.00
82- VII-14 00.00.00
82- VII-14 08.00.00
82- VII-14 16.00.00
82- VII-15 00.00.00
82- VII-15 08.00.00
82- VII-15 16.00.00
82- VII-16 00.00.00
82- VII-16 08.00.00
82- VII-16 16.00.00
82- VII-17 00.00.00
82- VII-17 08.00.00
82- VII-17 16.00.00
5 m/s
5 m/s

Figure 10A

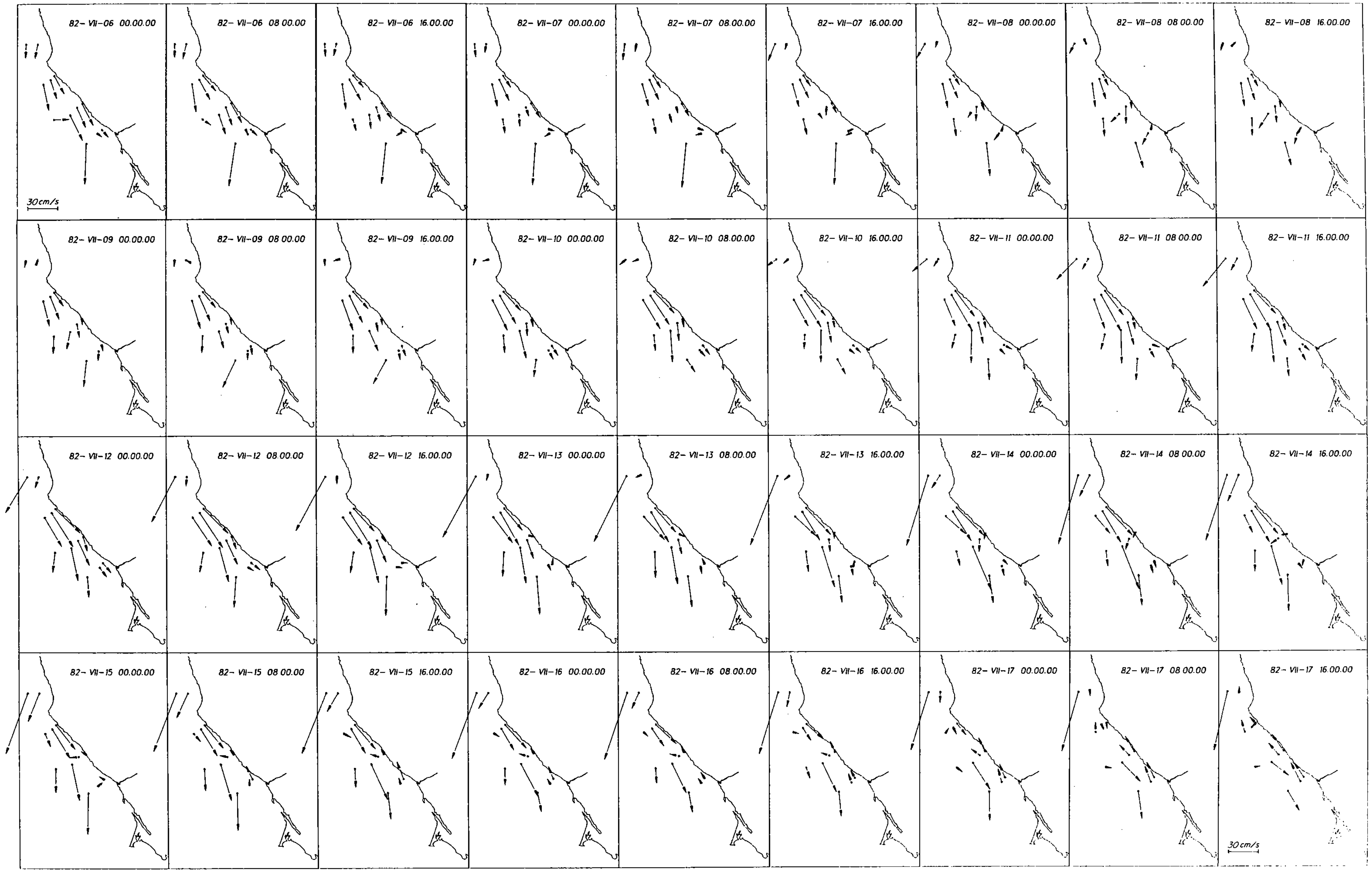

82- VII-06 00.00.00
82- VII-06 08.00.00
82- VII-06 16.00.00
82- VII-07 00.00.00
82- VII-07 08.00.00
82- VII-07 16.00.00
82- VII-08 00.00.00
82- VII-08 08.00.00
82- VII-08 16.00.00
30cm/s
82- VII-09 00.00.00
82- VII-09 08.00.00
82- VII-09 16.00.00
82- VII-10 00.00.00
82- VII-10 08.00.00
82- VII-10 16.00.00
82- VII-11 00.00.00
82- VII-11 08.00.00
82- VII-11 16.00.00
82- VII-12 00.00.00
82- VII-12 08.00.00
82- VII-12 16.00.00
82- VII-13 00.00.00
82- VII-13 08.00.00
82- VII-13 16.00.00
82- VII-14 00.00.00
82- VII-14 08.00.00
82- VII-14 16.00.00
82- VII-15 00.00.00
82- VII-15 08.00.00
82- VII-15 16.00.00
82- VII-16 00.00.00
82- VII-16 08.00.00
82- VII-16 16.00.00
82- VII-17 00.00.00
82- VII-17 08.00.00
82- VII-17 16.00.00
30cm/s

Figure 10B

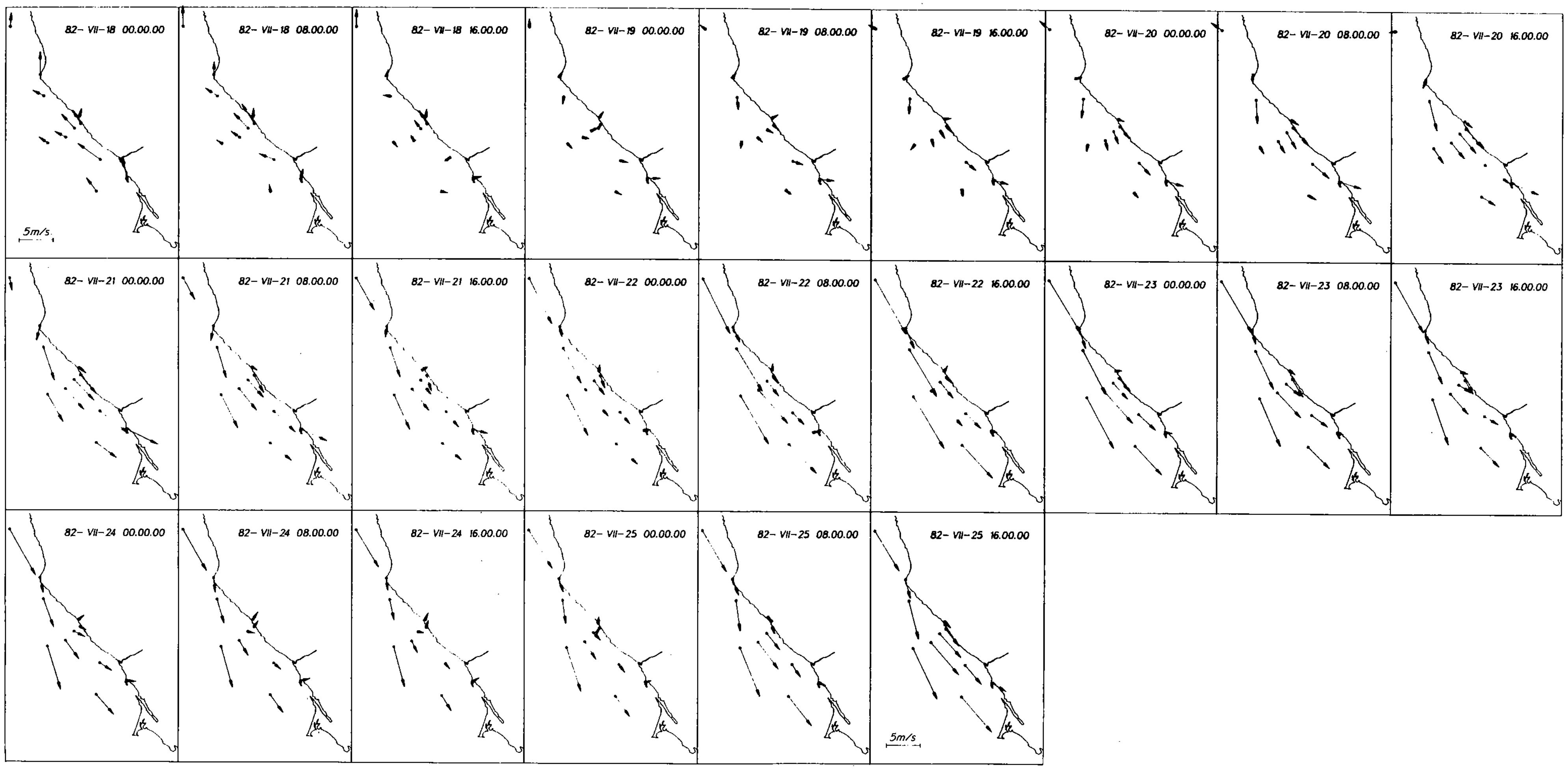

82- VII-18 00.00.00
82- VII-18 08.00.00
82- VII-18 16.00.00
82- VII-19 00.00.00
82- VII-19 08.00.00
82- VII-19 16.00.00
82- VII-20 00.00.00
82- VII-20 08.00.00
82- VII-20 16.00.00
82- VII-21 00.00.00
82- VII-21 08.00.00
82- VII-21 16.00.00
82- VII-22 00.00.00
82- VII-22 08.00.00
82- VII-22 16.00.00
82- VII-23 00.00.00
82- VII-23 08.00.00
82- VII-23 16.00.00
82- VII-24 00.00.00
82- VII-24 08.00.00
82- VII-24 16.00.00
82- VII-25 00.00.00
82- VII-25 08.00.00
82- VII-25 16.00.00
5m/s

Figure 11A

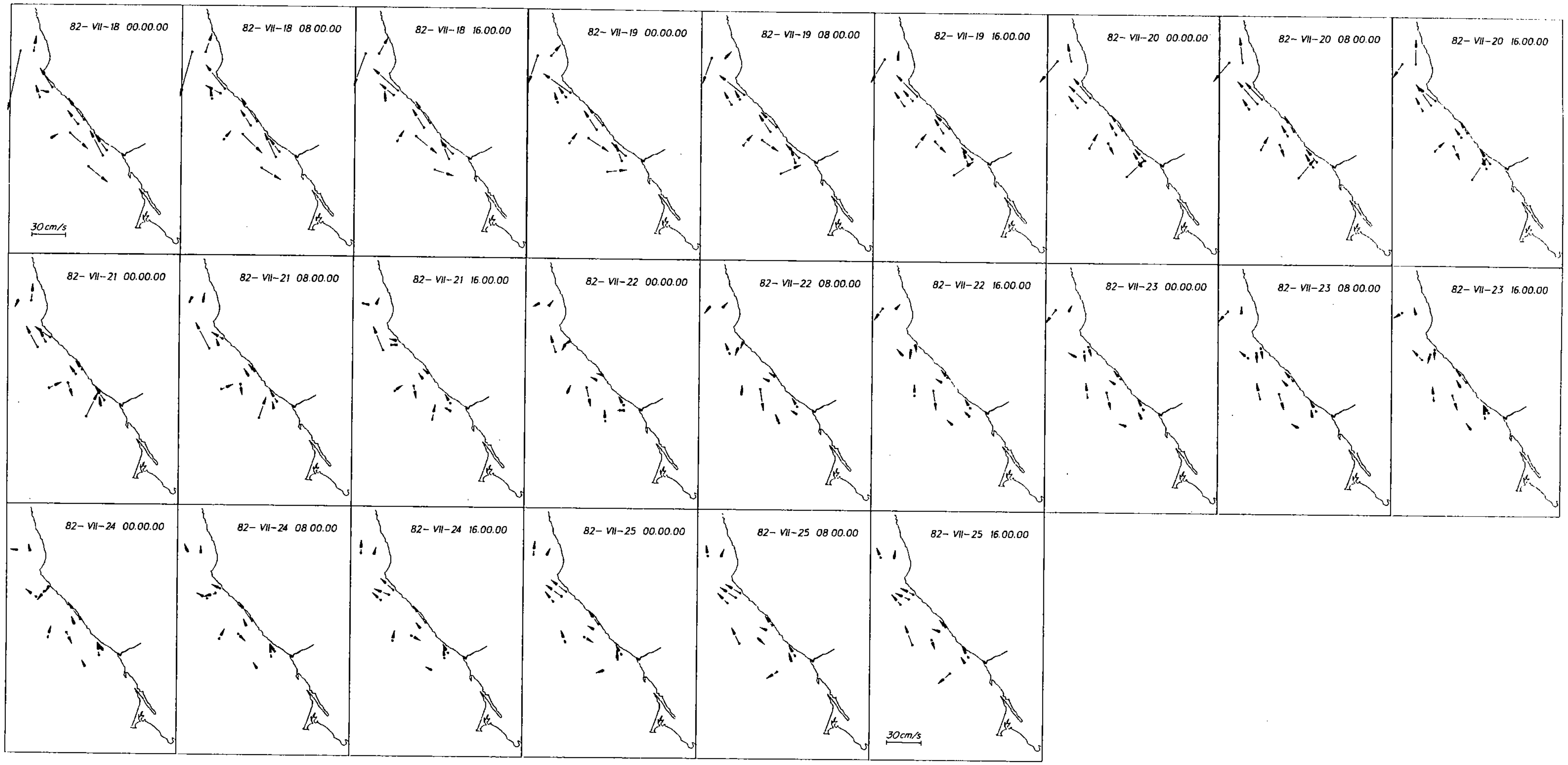

82- VII-18 00.00.00
82- VII-18 08 00.00
82- VII-18 16.00.00
82- VII-19 00.00.00
82- VII-19 08 00.00
82- VII-19 16.00.00
82- VII-20 00.00.00
82- VII-20 08 00.00
82- VII-20 16.00.00
30cm/s
82- VII-21 00.00.00
82- VII-21 08.00.00
82- VII-21 16.00.00
82- VII-22 00.00.00
82- VII-22 08.00.00
82- VII-22 16.00.00
82- VII-23 00.00.00
82- VII-23 08 00.00
82- VII-23 16.00.00
82- VII-24 00.00.00
82- VII-24 08 00.00
82- VII-24 16.00.00
82- VII-25 00.00.00
82- VII-25 08 00.00
82- VII-25 16.00.00
30cm/s

Figure 11B

CODE-2:
MOORED TEMPERATURE AND CONDUCTIVITY OBSERVATIONS

by

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A. INTRODUCTION

This report describes the moored temperature and conductivity observations made during the second major field phase of the Coastal Ocean Dynamics Experiment (CODE-2), which took place along the northern California shelf from March to August, 1982. The CODE-2 moored temperature array consisted of temperatures measured on each current meter deployed by C. Winant/R. Davis (SIO) and R. Beardsley (WHOI), and on bottom pressure instrumentation deployed by C. Winant (SIO), W. Brown/J. Irish (UNH) and N. Pettigrew/J. Irish (UNH). The moored density array consisted of arrays of temperature/conductivity pairs of sensors deployed by J. Irish/W. Brown (UNH) and conductivity sensors attached to moored current meters deployed by R. Beardsley (WHOI). No successful thermistor chain measurements were made during CODE-2. The final mooring locations are shown on Figure 1 and depths of each sensor at each station are given in Tables 1 and 2 along with the times and statistics of each record.

The sensors and calibration procedures are the same as used during CODE-1 and described in Brown, Irish and Bratkovich (1983). The accuracy and precision of the temperature measurements are given in Table 3, and in some cases differ from that found in CODE-1.

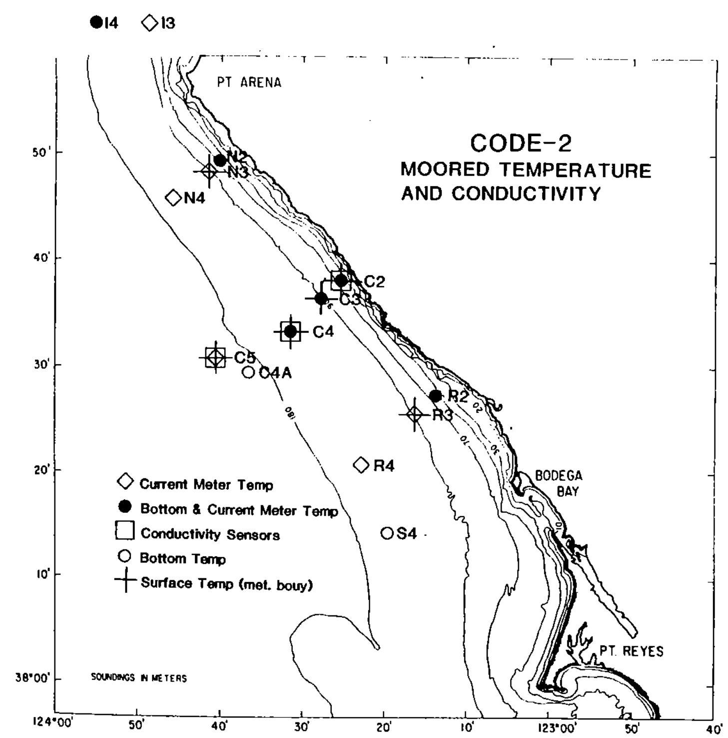

Figure 1: Station locations for the moored temperature-conductivity array for CODE-2.

The sample interval of the SIO current meters was four minutes, the WHOI current meters was 3.75 minutes and the UNH bottom temperatures and density arrays were sampled at 7.5 minutes and 15 minutes, respectively. As in CODE-1, the UNH microprocessor-based density array recorder also conditionally sampled all sensors at 15 second intervals during periods of "interesting" events (Irish, Brown and Howell, 1984).

B. DATA PROCESSING

The temperature time series were normalized by their pre- and post-cruise calibrations as described by Brown, Irish and Bratkovich (1983), and no further in-situ adjustments or intercalibrations were made. The density array temperature and conductivity sensor pairs were compared with the OSU hydrographic data (A. Huyer) to perform an in-situ "adjustment" to the pre-cruise calibrations to compensate for the drift of the conductivity sensor records (attributed to biological fouling). The constant off-

TABLE 1: CODE-2 Moored Temperature Records from North to South

Station	Water Depth (m)	Start Time (Mon/Day/Hr)	Stop Time (Mon/Day/Hr)	Duration (Days)	Instrument or Mooring I.D.	Sensor Depth (m)	Mean	Standard Deviation	Maximum	Minimum
I3	90	03/20/0600	08/11/1900	145	04	10	10.05	1.044	13.40	7.65
		03/11/0900	08/05/0800	147	58	20	9.86	1.005	13.05	7.75
		03/11/0300	08/11/1900	154	01	53	9.01	0.907	11.56	6.99
I4	130	03/11/0000	08/11/1900	154	09	10	10.63	0.904	13.58	8.29
		03/11/0900	08/05/0800	147	59	20	10.37	0.908	12.95	8.39
		03/11/0000	08/11/1900	154	03	53	9.42	0.940	11.63	7.36
	133	03/27/0500	08/03/1000	129	SHELDRAKE	BOT	8.31	0.	9.55	7.09
N2	60	03/11/0900	08/05/0800	147	65	10	9.98	1.131	13.30	7.86
		03/11/0600	08/11/0100	153	13	20	9.54	1.011	12.06	7.60
		03/12/0900	08/05/0800	146	62	35	9.22	0.931	11.66	7.55
		03/11/0600	08/15/0500	156	SIO	BOT	7.85	0.771	10.43	6.24
N3	90	04/08/1300	08/17/1100	131	WHOI	SUR	10.53	1.345	14.37	8.02
		03/11/0600	08/11/0100	153	11	10	10.05	0.990	12.80	7.91
		03/11/0900	08/05/0800	147	SIO	20	9.84	0.887	12.01	7.85
		03/12/0900	08/05/0800	146	68	35	9.24	0.841	11.63	7.55
		03/11/2100	08/10/2200	152	08	53	8.89	0.761	11.32	7.31
		03/12/0900	08/05/0800	146	64	70	8.69	0.689	10.67	7.03
		03/11/2100	08/10/2200	152	15	83	8.54	0.660	10.17	6.91
N4	129	03/24/1300	08/20/1100	149	B1	10	10.68	1.004	13.54	8.23
		03/24/1300	08/20/1200	149	B2	20	10.18	0.807	12.20	8.23
		03/25/1300	08/20/1200	148	S1	35	9.72	0.804	11.87	8.11
		03/25/1300	08/20/1200	148	S2	55	9.25	0.737	11.61	7.75
		03/25/1300	08/20/1200	148	S3	70	8.91	0.624	11.18	7.37
		03/25/1300	08/20/1200	148	S4	90	8.60	0.536	10.26	6.94
		03/25/1300	08/20/1200	148	S5	110	8.36	0.532	9.70	6.82
		03/25/1300	08/20/1100	148	S6	121	8.28	0.523	9.53	6.75
C2	60	03/23/1700	08/17/1600	147	WHOI	SUR	10.53	1.555	15.40	8.00
		03/12/0900	08/05/0800	146	56	10	10.16	1.179	14.13	7.99
		03/12/0600	08/13/2200	155	02	20	9.67	1.045	12.68	7.67
		03/12/0900	08/05/0800	146	51	35	9.24	0.964	11.90	7.45

TABLE 1: CODE-2 Moored Temperature Records (Continued)

Station	Water Depth (m)	Start Time (Mon/Day/Hr)	Stop Time (Mon/Day/Hr)	Duration (Days)	Instrument or Mooring I.D.	Sensor Depth (m)	Mean	Standard Deviation	Maximum	Minimum
	53	03/12/0900	08/05/0800	146	61	53	8.67	0.855	11.32	7.06
	61	03/23/1700	08/04/0100	133	PICKET	BOT	9.14	0.780	11.54	7.57
C3	93	03/24/1300	07/28/1200	126	WHOI	SUR	10.58	1.531	15.59	7.94
		03/24/1300	07/28/1200	126	B3	5	9.82	1.283	13.78	7.47
		03/24/1300	07/28/1200	126	B4	10a	10.08	1.154	13.46	7.94
	90	03/12/0300	08/05/0800	146	53	10b	10.35	1.180	13.96	8.07
	93	03/24/1300	07/28/1200	126	B5	15	9.85	1.058	13.07	7.94
	90	03/12/0900	08/09/1300	150	06	20	9.73	0.984	12.26	7.89
		03/12/0900	08/05/0800	146	69	35	9.36	0.897	11.73	7.73
		03/12/0300	08/09/1000	150	12	53	8.96	0.828	11.53	7.44
		03/12/0900	08/05/0800	146	67	70	8.85	0.741	11.02	7.37
		03/12/0300	08/09/1000	150	14	83	8.61	0.667	10.03	7.21
		03/12/0300	08/08/2300	150	SIO	BOT	8.67	0.643	10.07	7.31
C4	130	04/01/1300	08/17/1200	138	WHOI	SUR	10.76	1.384	14.64	8.04
		04/01/1300	08/17/1200	138	B2	10	10.49	1.233	14.51	8.02
		04/01/1300	08/17/1200	138	B3	20	10.12	0.990	13.30	7.98
		04/01/1300	08/17/1200	138	S1	35	9.66	0.810	11.94	7.91
		04/01/1300	08/17/1200	138	S2	55	9.22	0.676	11.68	7.81
		04/01/1300	08/17/1200	138	S3	70	8.95	0.583	11.40	7.76
		04/01/1300	08/17/1200	138	S4	90	8.65	0.533	10.23	7.40
		04/01/1300	08/17/1200	138	S5	110	8.40	0.508	9.79	7.21
		04/01/1300	08/17/1100	138	S6	121	8.33	0.504	9.44	7.17
		03/25/0300	08/03/1200	117	GERDA	BOT	8.43	0.562	9.59	7.30
		04/02/0900	04/29/1800	27	DAPCM1	BOT	8.53	0.774	9.54	7.29
		05/06/0500	08/03/1600	88	DAPCM2	BOT	8.35	0.372	9.08	7.47
C4A	202	03/23/0900	08/03/2200	134	KELVIN	BOT	8.05	0.293	8.91	7.31
C5	400	03/30/1300	08/19/1200	142	WHOI	SUR	11.54	1.236	15.50	9.43
		03/30/1300	08/19/1200	142	B3	20	10.68	0.968	14.93	8.90
		03/30/1300	08/19/1100	142	B4	35	10.41	0.765	13.36	8.87
		03/30/1300	08/19/1200	142	B5	55	9.91	0.698	11.96	8.54
		03/30/1300	08/19/1200	142	S1	70	9.49	0.561	11.63	8.33

TABLE 1: CODE-2 Moored Temperature Records (Continued)

Station	Water Depth (m)	Start Time (Mon/Day/Hr)	Stop Time (Mon/Day/Hr)	Duration (Days)	Instrument or Mooring I.D.	Sensor Depth (m)	Mean	Standard Deviation	Maximum	Minimum
		03/30/1300	08/19/1200	142	S2	90	9.07	0.414	10.53	8.25
		03/30/1300	08/19/1200	142	S3	110	8.77	0.398	10.11	7.80
		03/30/1300	08/19/1200	142	S4	150	8.32	0.358	9.52	7.25
		03/30/1300	08/19/1200	142	S5	250	7.63	0.239	8.34	6.86
		03/30/1300	08/19/1100	142	S6	350	6.96	0.282	7.74	6.09
R2	60	03/13/0900	08/05/0800	125	SIO	10	10.22	1.124	14.20	8.07
		03/12/2100	08/10/1000	151	10	20	9.70	0.987	12.40	7.79
		03/13/0900	08/05/0800	145	50	35	9.65	0.883	12.09	8.19
		03/13/0900	08/05/0800	145	66	53	9.21	0.818	11.70	7.81
		03/12/2200	08/09/1200	150	SIO	BOT	9.19	0.758	11.61	7.85
R3	90	03/23/1300	08/17/1200	147	WHOI	SUR	10.77	1.513	15.31	7.99
		03/13/0900	08/05/0800	145	60	10	10.15	1.050	13.55	8.03
		03/13/0000	08/14/1600	155	07	20	9.75	0.908	12.28	7.87
		03/13/0900	08/05/0800	145	54	35	9.49	0.838	11.81	7.89
		03/13/0300	08/14/1900	155	05	53	9.00	0.752	11.13	7.61
		03/13/0900	08/05/0800	145	55	70	8.87	0.675	10.63	7.68
		03/13/0900	08/05/0800	145	SIO	83	8.87	0.618	10.25	7.77
R4	130	04/02/1300	08/18/1200	138	B1	10	10.47	1.116	14.00	8.47
		04/02/1300	08/18/1200	138	B2	20	10.15	0.936	13.18	8.34
		03/26/1300	08/14/1200	141	S1	35	9.81	0.798	12.41	8.07
		03/26/1300	08/14/1200	141	S2	55	9.35	0.622	11.30	7.79
		03/26/1300	08/14/1200	141	S3	70	9.08	0.542	10.94	7.75
		03/26/1300	08/14/1200	141	S4	90	8.79	0.483	10.22	7.75
		03/26/1300	08/14/1200	141	S5	110	8.56	0.419	9.79	7.73
S4	132	03/26/0700	08/05/1400	132	KIWI	BOT	8.61	0.390	9.72	7.90
B4	130	04/02/1900	06/12/0200	70	VOGEL	BOT	8.75	0.265	9.61	8.12

TABLE 2: CODE-2 Moored Density Array

Station	Water Depth (m)	Start Time (Mon/Day/Hr)	Stop Time (Mon/Day/Hr)	Duration (Days)	Instrument or Mooring I.D.	Sensor Depth (m)	Mean	Standard Deviation	Maximum	Minimum	Variables
C2 T	61	3/23/1600	07/20/1200	119	PICKET	50	9.24	0.942	12.01	7.64	Temperature, Deg C
C	61	3/23/1600	07/20/1200	119	PICKET	50	3.620	0.0611	3.794	3.498	Conductivity, S/M
S	61	3/23/1600	07/20/1200	119	PICKET	50	33.76	0.326	34.04	31.71	Salinity, PPT
D	61	3/23/1600	07/20/1200	119	PICKET	50	26.13	0.394	26.59	24.06	Sigma-T, Kg/M3
C4 T	132	3/25/0200	07/21/1300	119	GERDA	24	10.04	0.960	13.09	8.06	Temperature, Deg C
C	132	3/25/0200	07/21/1300	119	GERDA	24	3.668	0.0620	3.951	3.532	Conductivity, S/M
S	132	3/25/0200	07/21/1300	119	GERDA	24	33.53	0.370	34.00	32.34	Salinity, PPT
D	132	3/25/0200	07/21/1300	119	GERDA	24	25.81	0.434	26.50	24.59	Sigma-T, Kg/M3
T	132	3/25/0200	07/21/1300	119	GERDA	37	9.71	0.872	12.03	7.80	Temperature, Deg C
C	132	3/25/0200	07/21/1300	119	GERDA	37	3.645	0.0527	3.779	3.534	Conductivity, S/M
S	132	3/25/0200	07/21/1300	119	GERDA	37	33.59	0.313	34.06	32.53	Salinity, PPT
D	132	3/25/0200	07/21/1300	119	GERDA	37	25.92	0.383	26.55	24.79	Sigma-T, Kg/M3
T	132	3/25/0200	07/21/1300	119	GERDA	59	9.24	0.725	11.73	7.91	Temperature, Deg C
C	132	3/25/0200	07/21/1300	119	GERDA	59	3.617	0.0493	3.749	3.517	Conductivity, S/M
S	132	3/25/0200	07/21/1300	119	GERDA	59	33.73	0.213	33.97	32.71	Salinity, PPT
D	132	3/25/0200	07/21/1300	119	GERDA	59	26.11	0.275	26.50	24.90	Sigma-T, Kg/M3
T	132	3/25/0200	07/21/1300	119	GERDA	67	9.05	0.661	11.30	7.82	Temperature, Deg C
C	132	3/25/0200	07/21/1300	119	GERDA	67	3.607	0.0477	3.729	3.516	Conductivity, S/M
S	132	3/25/0200	07/21/1300	119	GERDA	67	33.81	0.183	34.25	32.79	Salinity, PPT
D	132	3/25/0200	07/21/1300	119	GERDA	67	26.19	0.235	26.63	25.12	Sigma-T, Kg/M3
T	132	3/25/0200	07/21/1300	119	GERDA	82	8.86	0.614	10.98	7.68	Temperature, Deg C
C	132	3/25/0200	07/21/1300	10	GERDA	82	3.668	0.0109	3.706	3.649	Conductivity, S/M
S	132	3/25/0200	07/21/1300	10	GERDA	82	33.79	0.0344	33.91	33.69	Salinity, PPT
D	132	3/25/0200	07/21/1300	10	GERDA	82	26.07	0.048	26.17	25.93	Sigma-T, Kg/M3
T	132	3/25/0200	07/21/1300	119	GERDA	108	8.52	0.575	10.00	7.35	Temperature, Deg C
C	132	3/25/0200	07/21/1300	119	GERDA	108	3.578	0.0431	3.682	3.477	Conductivity, S/M
S	132	3/25/0200	07/21/1300	119	GERDA	108	33.99	0.119	34.17	33.65	Salinity, PPT
D	132	3/25/0200	07/21/1300	119	GERDA	108	26.42	0.175	26.68	25.93	Sigma-T, Kg/M3
T	132	3/25/0300	07/20/1200	118	GERDA	BOT	8.43	0.562	9.59	7.30	Temperature, Deg C
C5 T	400	3/30/1300	07/21/1200	141	WHOI	10	11.34	1.182	15.52	9.39	Temperature, Deg C
C	400	3/30/1300	07/21/1200	141	WHOI	10	3.742	0.0990	4.074	3.601	Conductivity, S/M
S	400	3/30/1300	07/21/1200	141	WHOI	10	33.09	0.395	33.87	31.58	Salinity, PPT
D	400	3/30/1300	07/21/1200	141	WHOI	10	25.24	0.444	26.04	23.88	Sigma-T, Kg/M3

sets in the UNH temperature records seen during CODE-1 were not apparent in the CODE-2 data, and the increased accuracy in Table 4 reflects the electronic corrections made to these sensors.

The OSU CTD observations taken near the density moorings were used for the in-situ calibration. All appropriate profiles were tabulated, and the temperature, conductivity, salinity and density values at the depths of the moored sensors were compared with the moored observations at the time of the CTD profiles. Also for a visual check, all appropriate CTD values were plotted on time series plots of temperature, conductivity, salinity and sigma-t. CTD profiles which were definitely in "different water" from the mooring were then eliminated and the resulting difference time series or drift series were fit by a linear trend. This trend was subtracted from the conductivity record, the salinity and density recalculated with the "corrected" conductivity, and these new series again compared with the CTD observations. Further corrections were made until the conductivity, salinity and density series were all consistent with the CTD profiles. Table 4 lists the corrections which were applied to the conductivity series. The time series of salinity and sigma-t, which were calculated from the temperature, and corrected conductivity for each sensor pair, are saved with the measured temperature and conductivity records.

All time series were filtered from their individual raw sample intervals to hourly intervals by a two-hour triangular filter and the results plotted for each mooring in Figures 2-21. Each separate series is plotted relative to its mean value at the level denoted by the tick mark on the vertical axis. The start times of the plots are all at 0000 GMT on 1 March 1982, and one tick mark on the horizontal axis corresponds to one day.

C. PRELIMINARY DISCUSSION

There are three major low-frequency events apparent in the temperature records (Figures 2-15). The first occurs during the two-week period of 9 April 1982 to 24 April 1982, which includes the spring transition around 17 April 1982. This event has a signature which is seen not only in the temperature records, but also appears in the salinity and density records (Figures 16, 19 and 20). The event is apparent at all depths at all moorings with the exception of the C5 mooring, which only has a small signature at shelf depths during this time. Station C5 reflects open ocean conditions more than shelf variations. A second event is apparent in the temperature records for the week around 29 May 1982. This event appears in the surface layers, decaying with depth, and also decaying offshore. It is not seen at the I line, and is seen at N2 and N3, but not N4. Along the central line it is strong at C2 and C3, but weak at C4 and not seen at C5. Along the Ross line, it is seen at R2 and R3, but not apparent at R4. Therefore, this second event is confined shoreward of the 100 to 130 m isobath, and does not appear to get north of Point Arena.

The third event occurs from 18 May 1982 through 8 June 1982 and is larger than the second. It appears only in the temperature records, and not in salinity (see Figures 16, 19 and 21). It has its greatest signature in the surface regions, and decays to near zero at the bottom, and is seen at all

TABLE 3: CODE-2 Temperature Measurement Uncertainties in Degrees Centigrade

	Accuracy	Precision
SIO VMCM (S/N < 50)	±0.1	±0.03
SIO VMCM (S/N > 50)	±0.1	±0.0004
WHOI VMCM	±0.2	±0.002
WHOI VACM	±0.005	±0.00015
UNH Bottom	±0.02	±0.003
UNH Density Array	±0.005	±0.0001

TABLE 4: Corrections Applied to the CODE-2 Moored Sea Bird Conductivity Sensors in Order to Minimize Differences from CTD Observations.

Mooring	Serial Number	Depth (dbars)	Correction Subtracted from Conductivity
C2	69	50	0.00 S/m - 5.8332 x 10^{-6} S/m/hour
C4	87	24	-0.01 S/m - 8.32 x 10^{-6} S/m/hour
	86	37	-0.007 S/m - 1.567 x 10^{-5} S/m/hour
	85	59*	-0.004 S/m - 2.050 x 10^{-5} for terms 1-2397
			-0.016 S/m + 5.100 x 10^{-3} for terms 2398-2427
			+0.021 S/m - 2.050 x 10^{-5} for terms 2428-11380
	84	67	-0.006 S/m - 5.00 x 10^{-6} S/m/hour
	82	82	-0.005 S/m (short record, no slope determined)
	81	108	-0.006 S/m - 1.73 x 10^{-5} S/m/hour
C5		10	

*A sudden shift was observed to occur during a 7-hour section of the conductivity record at 59 meters at C4. Otherwise the record showed a steady drift of the magnitude observed in the other sensors and ascribed to biological fouling. Therefore, a three piece correction was applied to remove drift and the observed jump in conductivity of this sensor.

stations, indicating a broader spatial extent than event two.

The moored salinity data show the first event (Figures 16, 19 and 21), but not the second and third events which are seen in the temperature records. The density records (Figures 16, 20 and 21), which reflect how these events would appear in the dynamics, show only temperature effects and are much smaller than the first event. However, the first event is marked by a strong signature in the salinity record which indicates that this event is due to an increase in the volume of warm, fresh water over the shelf regions. Its temperature signal is strongest near the coast and almost vanishes by the time C5 is reached. The density records show this event signal, again strongest near the coast and decaying offshore (see C line in Figures 7, 8, 9, 11, 16, 17, 20 and 21).

The moored density at C4 (Figure 20) during the first event shows the density record fairly constant until around 7 April, when it drops. Density remains constant until the spring transition on 17 April, when it rises sharply, reaching a value greater than before the start of the first event. The warm, fresh pulse of water creates the lower than normal density which makes the spring transition more apparent.

The spectra of some temperature records (see Figures 22, 23 and 24) show the typically "red" geophysical behavior. The greatest energy is in the low frequency bands, and is about two orders of magnitude greater than the tidal energy. There are significant tidal peaks at both the diurnal and semidiurnal tidal lines, and a significant peak in some records at the inertial peak. The tidal peaks during CODE-2 are larger than were typically seen during CODE-1.

A horizontal series of four spectra of moored temperature along the CODE-2 central line at 35 meters depth (Figure 22) show about equally energetic signals out to tidal frequencies. There is a non-significant tendency in the lowest frequency bands for the shoreward energy to be highest, and for the energy to decay offshore. The semidiurnal tidal peak is significant and about equal in amplitude at the four stations. At frequencies above the semidiurnal tides (in the internal wave band), the spectra increase with distance offshore.

A vertical series of temperature spectra at C4 (Figure 23) show decreasing energy with increasing depth, as is clearly visible in the time series plots in Figure 9. The record at 10 meters shows a distinct, very strong diurnal signal which is not apparent in the deeper records. In the internal wave band, the spectra (with the exception of the 110 m record) are nearly equal. The deep and bottom records show a markedly different character in having lower energy, especially at higher frequencies.

The moored temperature spectrum from the C4 density array at 37 meters is statistically identical with that from the C4 current meter temperature at 35 meters. Figure 24 shows the accompanying salinity and density spectra from 37 meters depth (see Figures 19 and 20). The spectra show the same general shape; highest energy at low frequency, a decrease in energy with increasing frequency with a semidiurnal tidal peak superimposed.

In summary, the records are dominated by low-frequency, large-event signals, and the tides are typically a couple orders of magnitude lower than these low frequency oscillations. There is a slight tendency for the low frequency signals to increase shoreward, and there is a marked decrease of more than a decade going from the top to bottom of the water column. The C5 station offshore shows significantly different signature than the CODE-2 shelf measurements.

Acknowledgments

The CODE-2 field program is the result of the efforts of many people from the various institutions as follows. At UNH: Wendell Brown, Jim Irish, Neal Pettigrew, Ed Lacoursiere, and Tom Howell; at SIO: Clint Winant, Mike Kirk, Phil Dacri, Al Bratkovich and Steven Lentz; and at WHOI: Bob Beardsley, Dick Limeburner, Carol Mills and the WHOI Buoy Group. The skill and cooperation of the officers and crew of the R/V WECOMA (OSU) helped make our seagoing operations possible and productive. The officers and crew of the U.S. Coast Guard Base at Yerba Buena Island were a key factor in the efficiency and flexibility with which we were able to execute the CODE field effort at such long distances from our home bases. The CODE-2 effort was supported by NSF under grants OCE 80-14940 (UNH), OCE 80-14941 (WHOI) and OCE 80-14942 (SIO).

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Brown, W. S., J. D. Irish and A. W. Bratkovich (1983) CODE-1: Moored temperature and conductivity observations in "CODE-1: Moored Array and Large-Scale Data Report" L. K. Rosenfeld, ed., Woods Hole Oceanographic Institution Technical Report No. 83-23, CODE Technical Report No. 21, 81-116.

Irish, J. D., W. S. Brown and T. L. Howell (1984) The use of microprocessor technology for the conditional sampling of intermittent ocean processes. J. Atmos. Ocean. Tech., 1:1, 58-68.

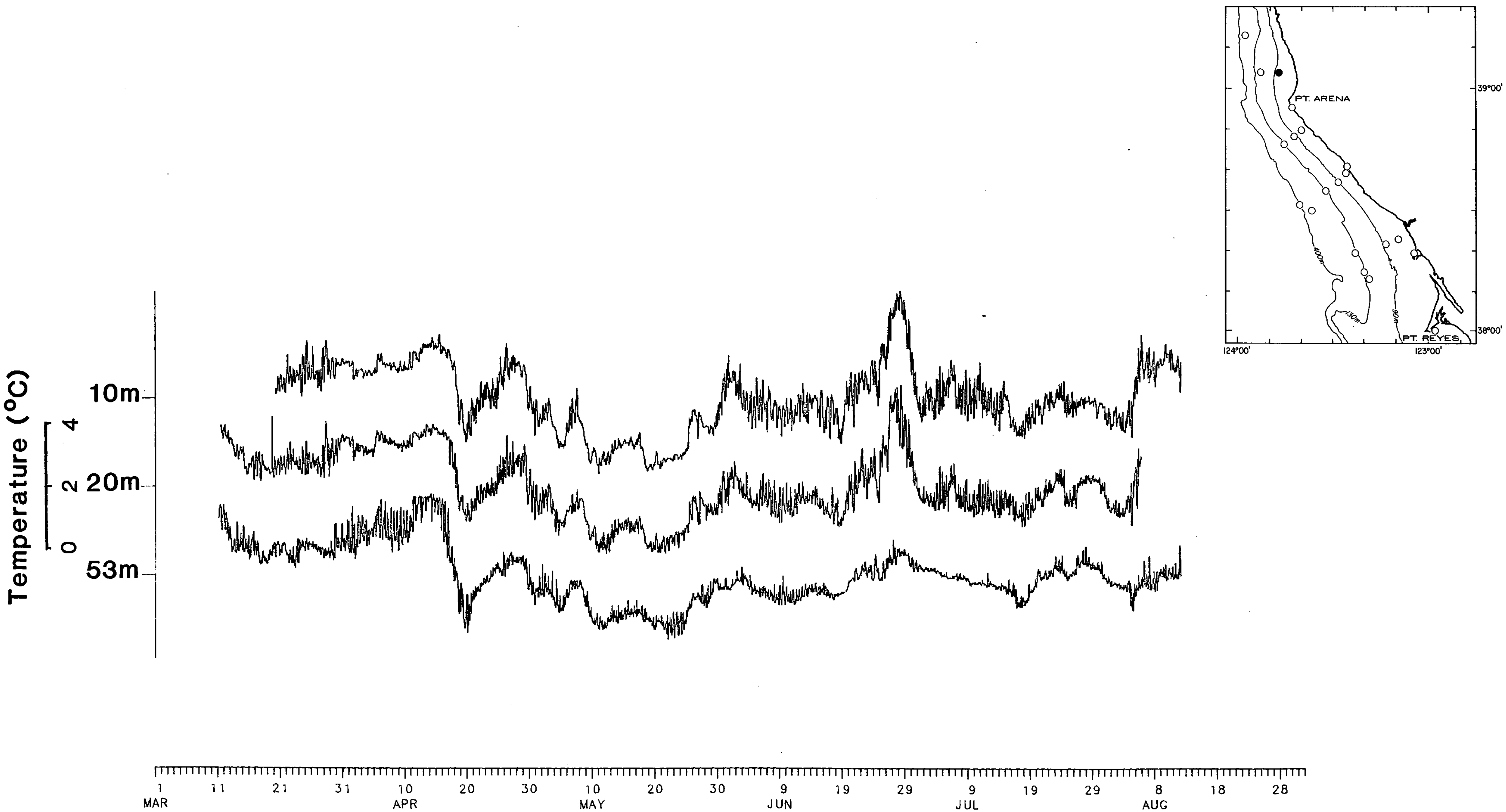


Figure 2: I3 temperatures. Each series is plotted relative to its mean value tabulated in Table 1 at the level marked by the tick on the vertical axis.

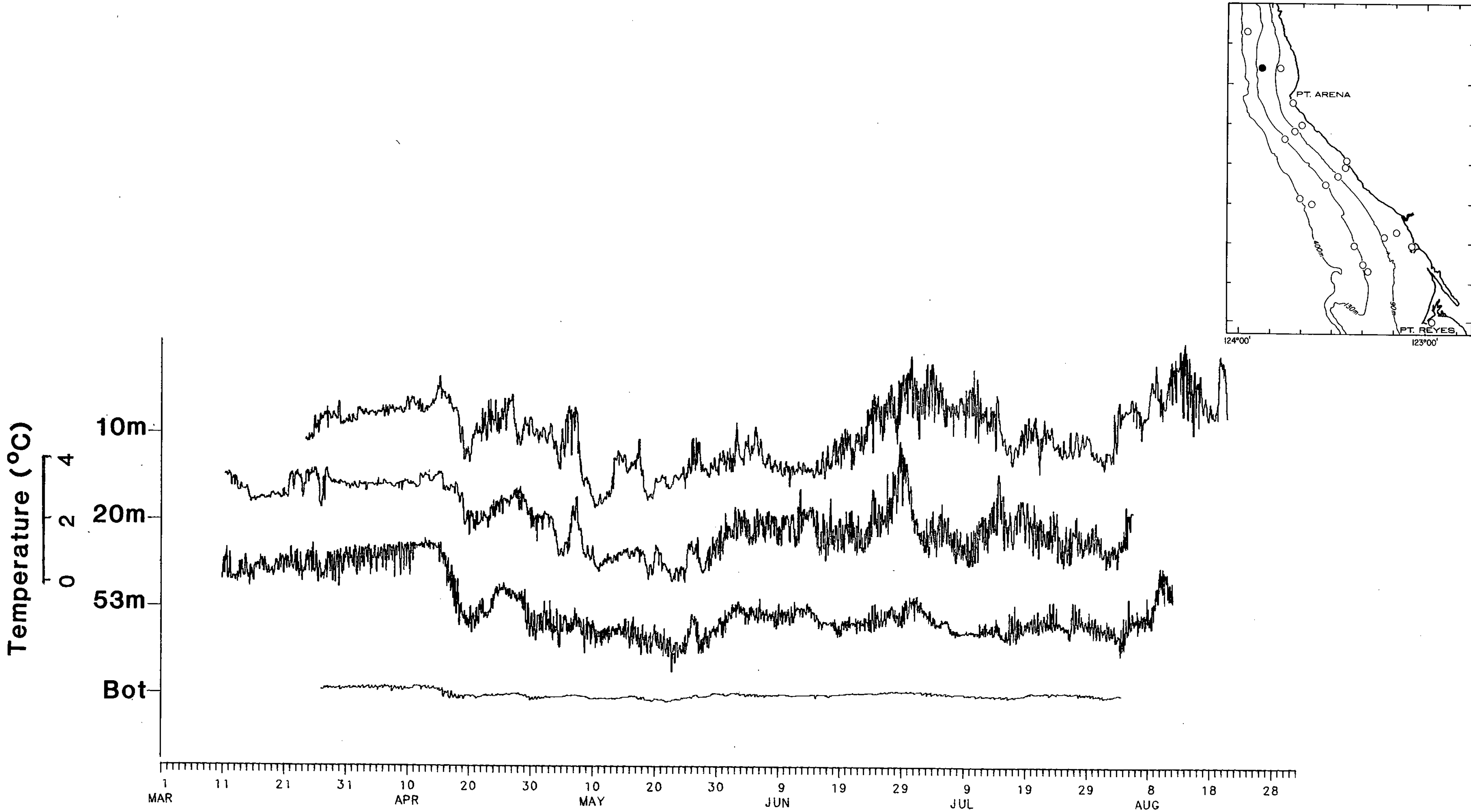


Figure 3: I4 temperatures. Each series is plotted relative to its mean value tabulated in Table 1 at the level marked by the tick on the vertical axis.

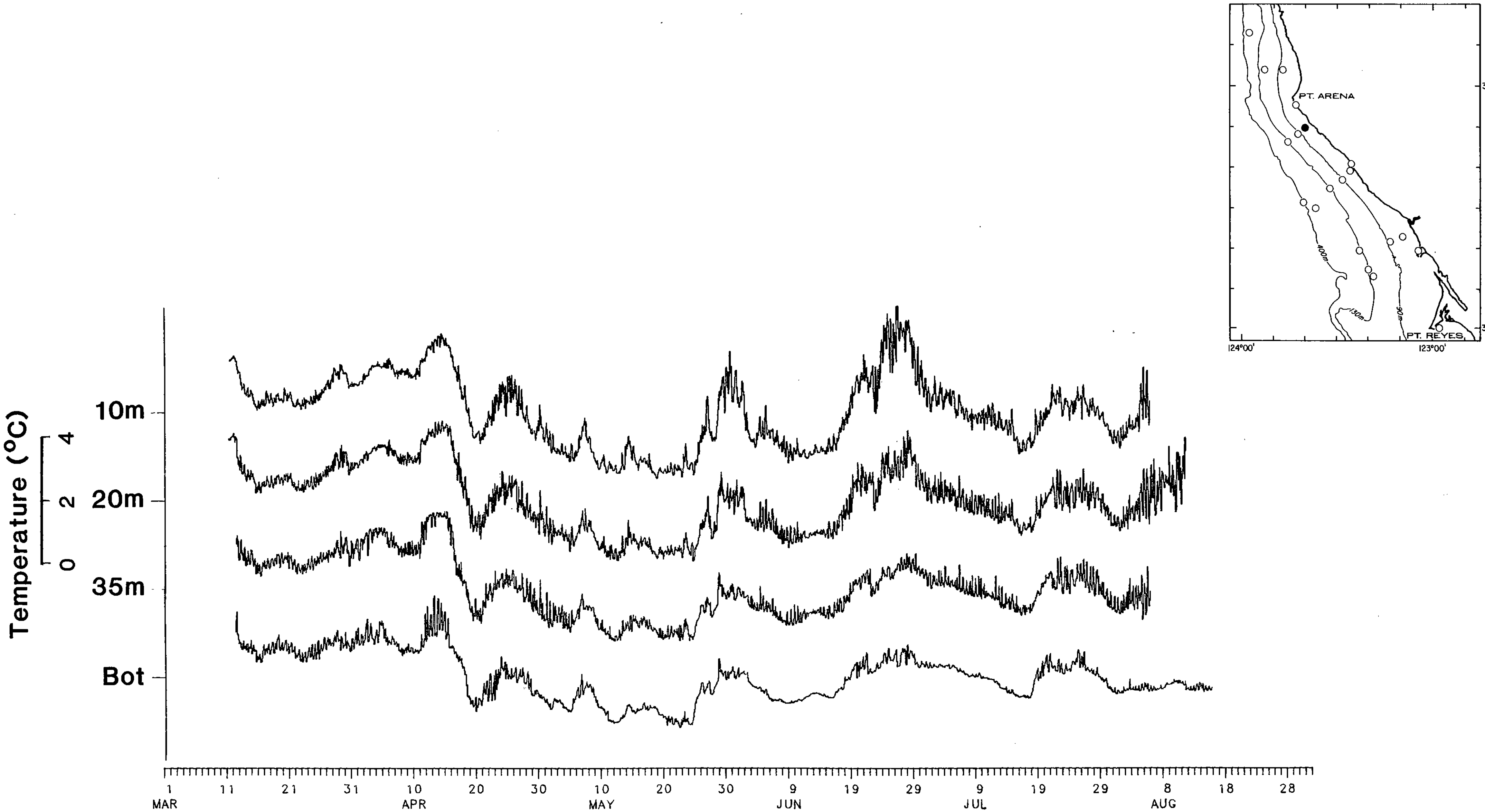


Figure 4: N2 temperatures. Each series is plotted relative to its mean value tabulated in Table 1 at the level marked by the tick on the vertical axis.

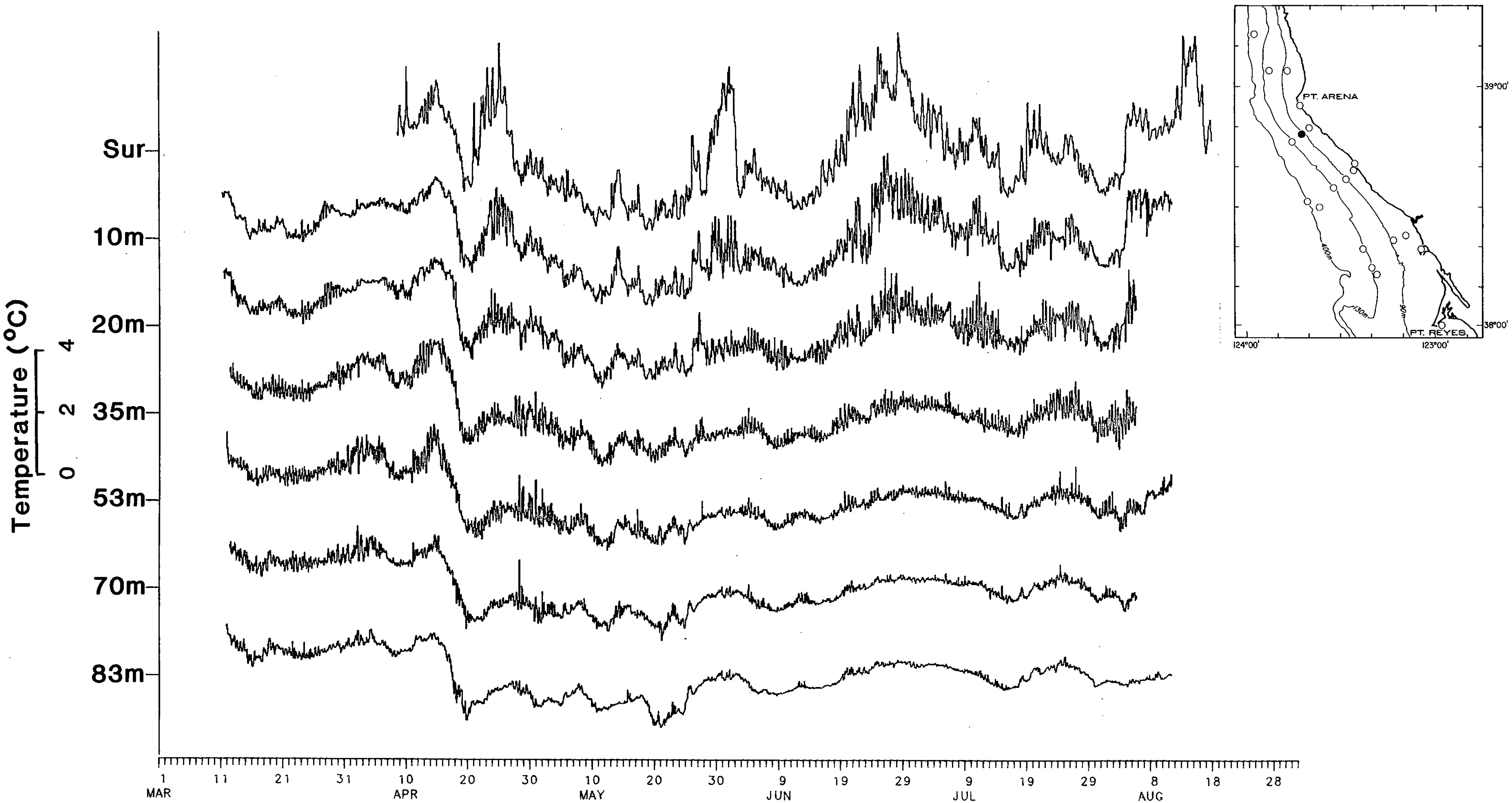


Figure 5: N3 temperatures. Each series is plotted relative to its mean value tabulated in Table 1 at the level marked by the tick on the vertical axis.

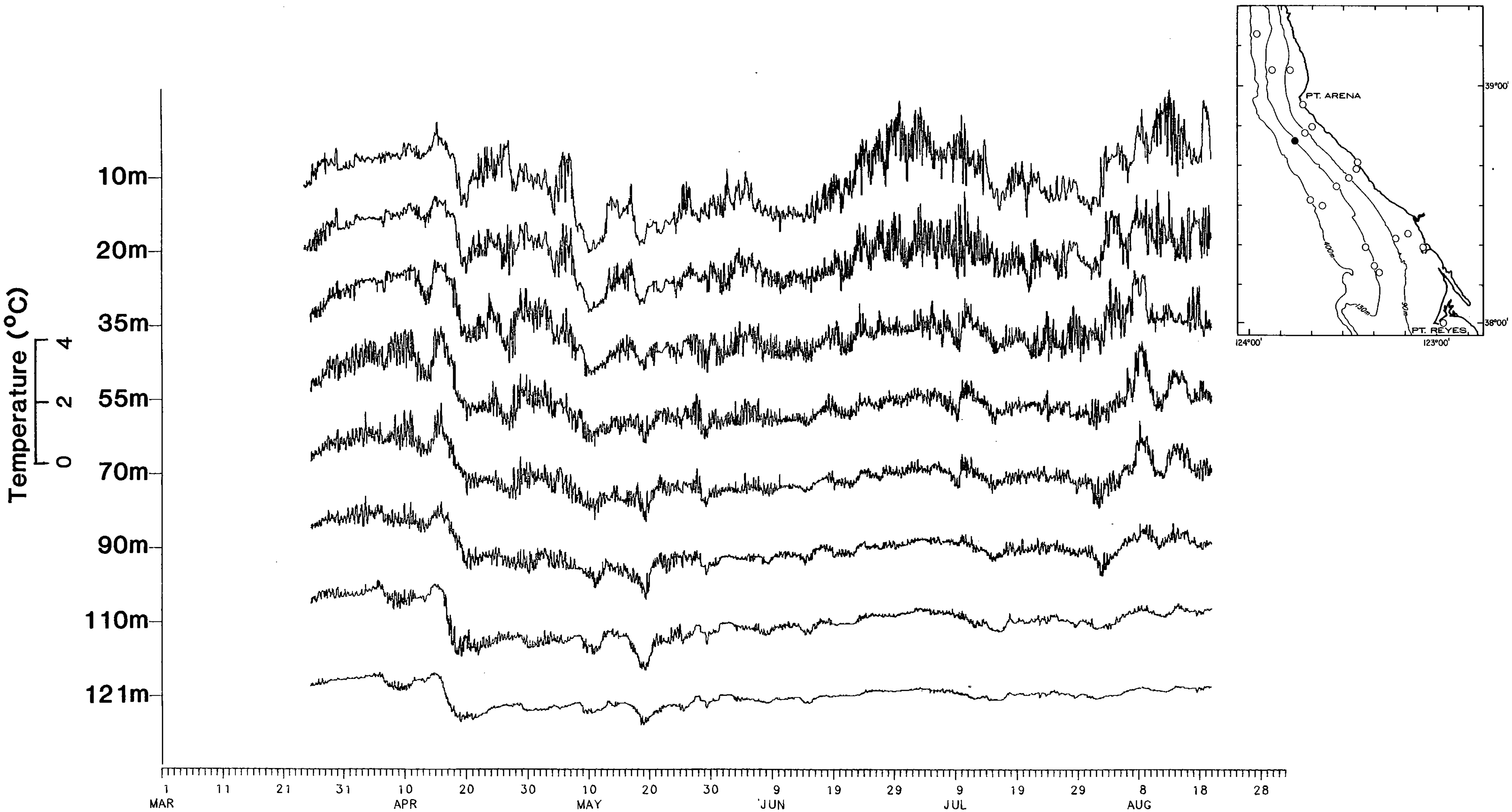


Figure 6: N4 temperatures Each series is plotted relative to its mean value tabulated in Table 1 at the level marked by the tick on the vertical axis.

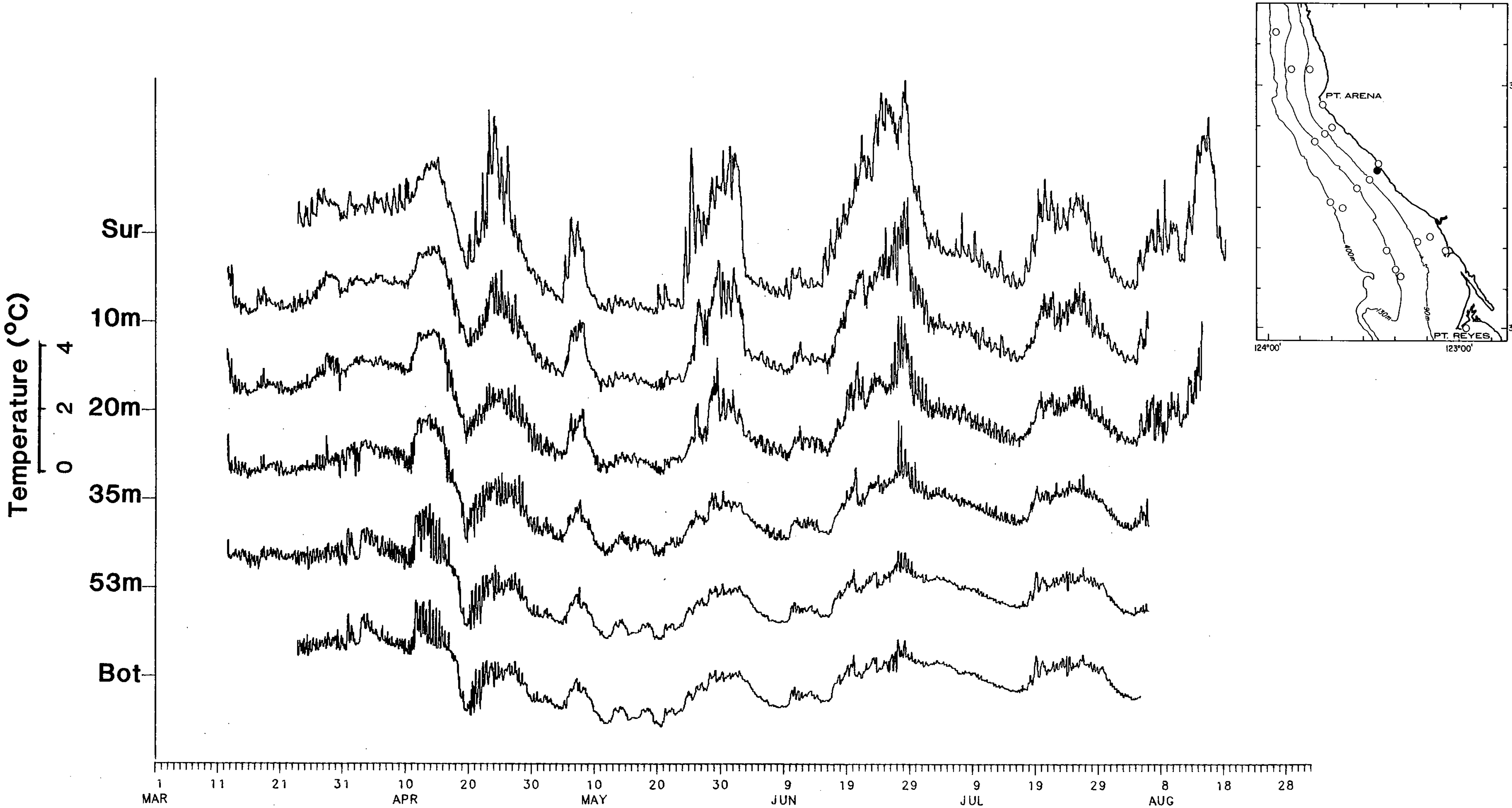


Figure 7: C2 temperatures. Each series is plotted relative to its mean value tabulated in Table 1 at the level marked by the tick on the vertical axis.

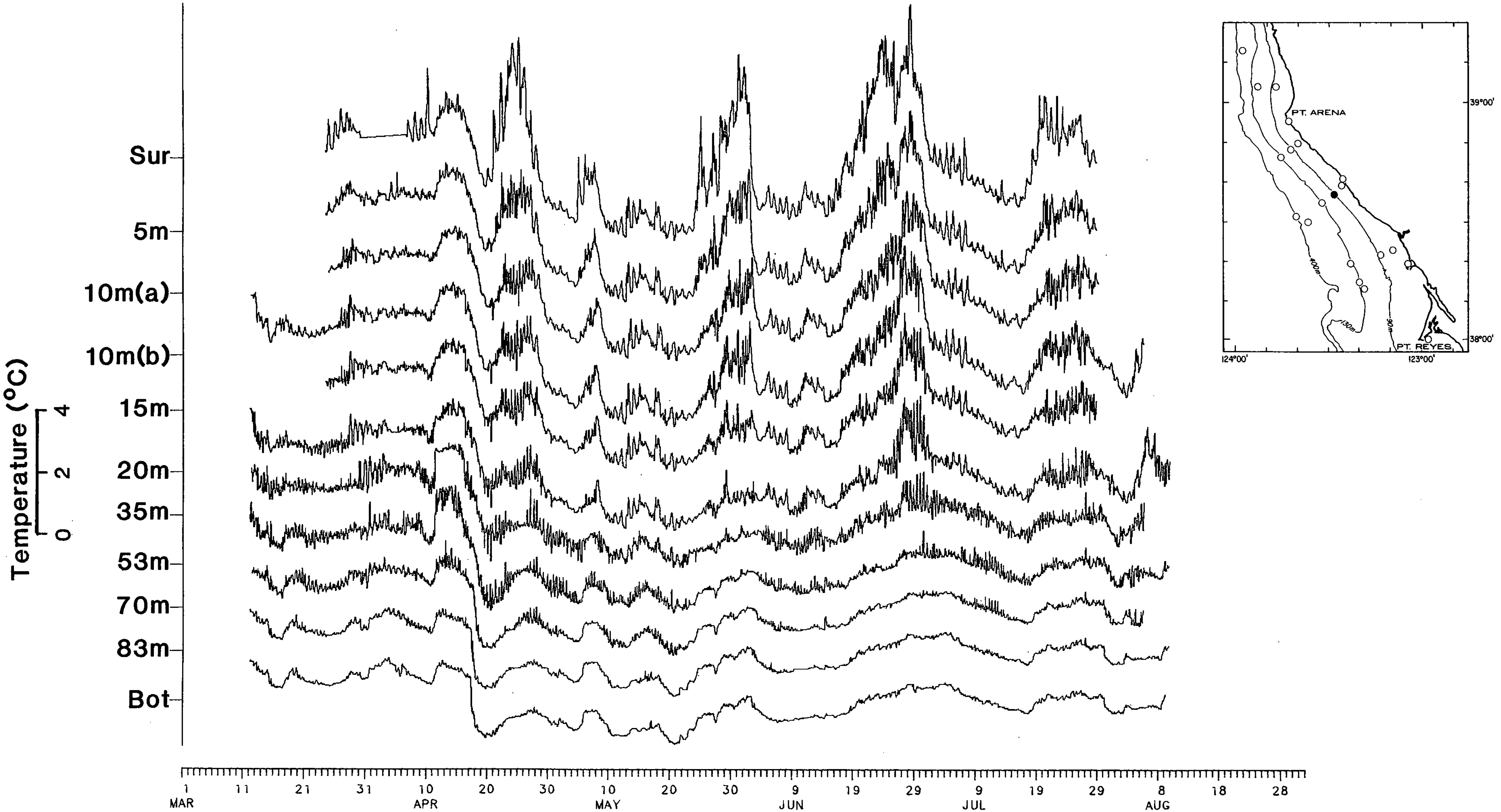


Figure 8: C3 temperatures. Each series is plotted relative to its mean value tabulated in Table 1 at the level marked by the tick on the vertical axis.

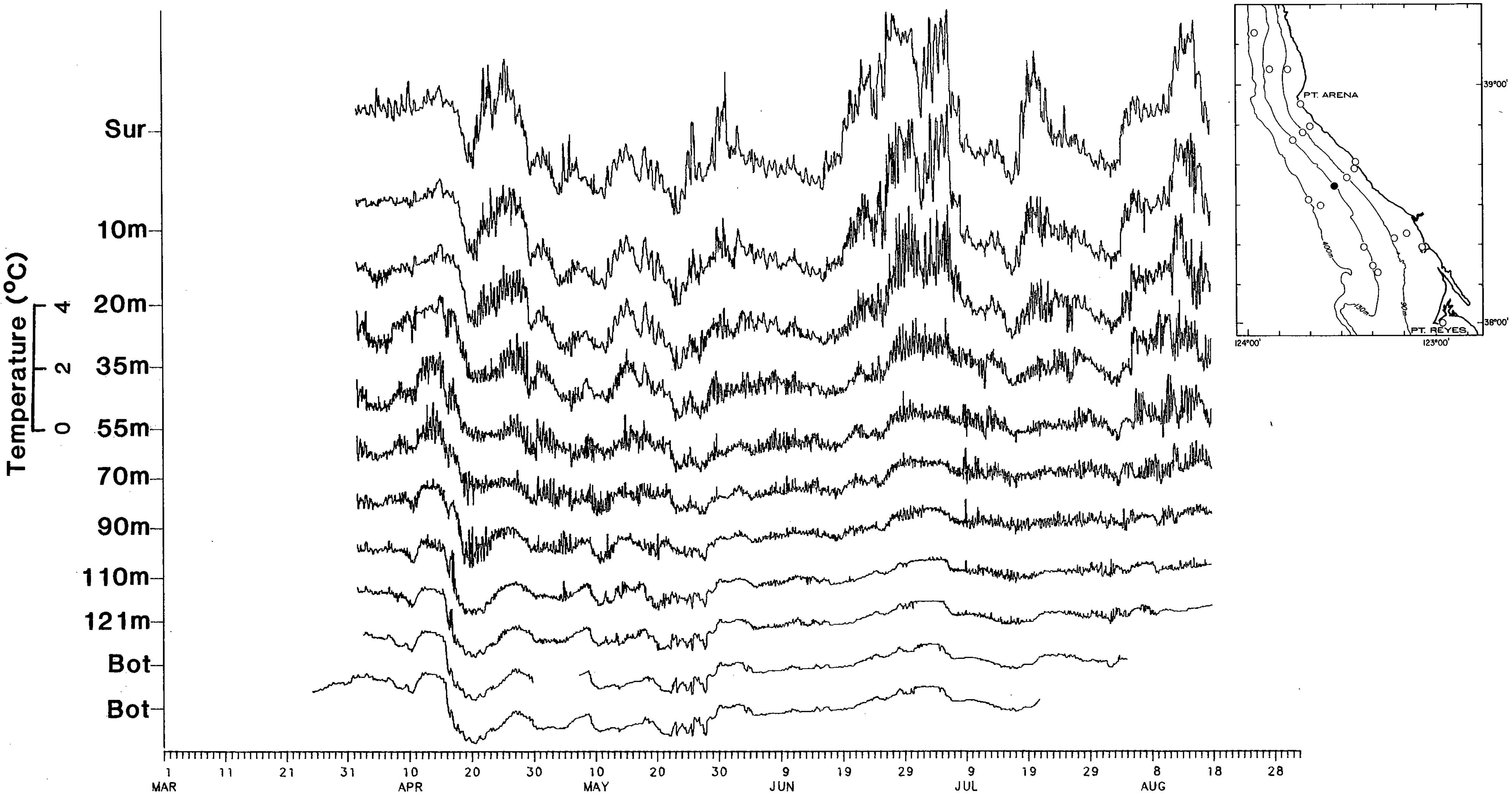
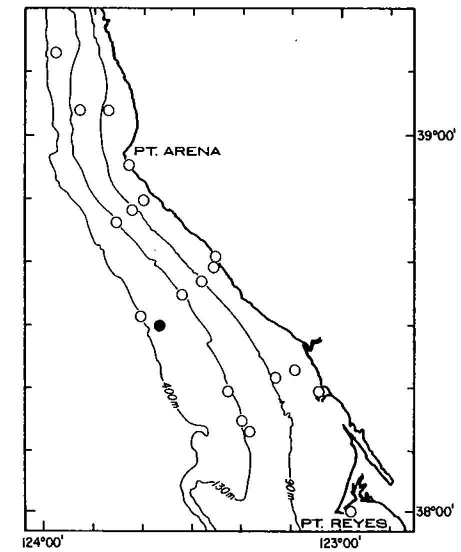


Figure 9: C4 temperatures. Each series is plotted relative to its mean value tabulated in Table 1 at the level marked by the tick on the vertical axis.



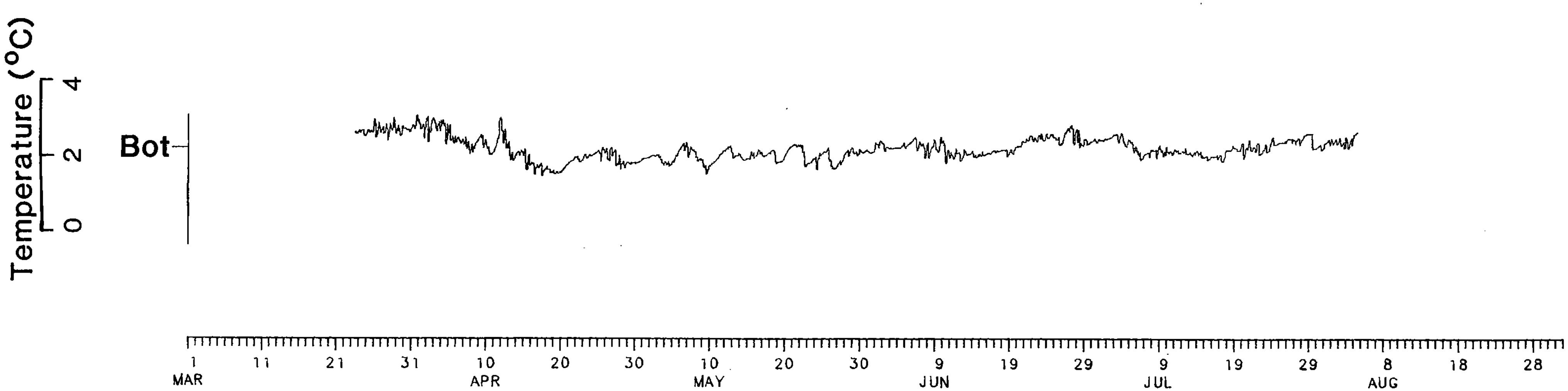


Figure 10: C4A temperatures. Each series is plotted relative to its mean value tabulated in Table 1 at the level marked by the tick on the vertical axis.

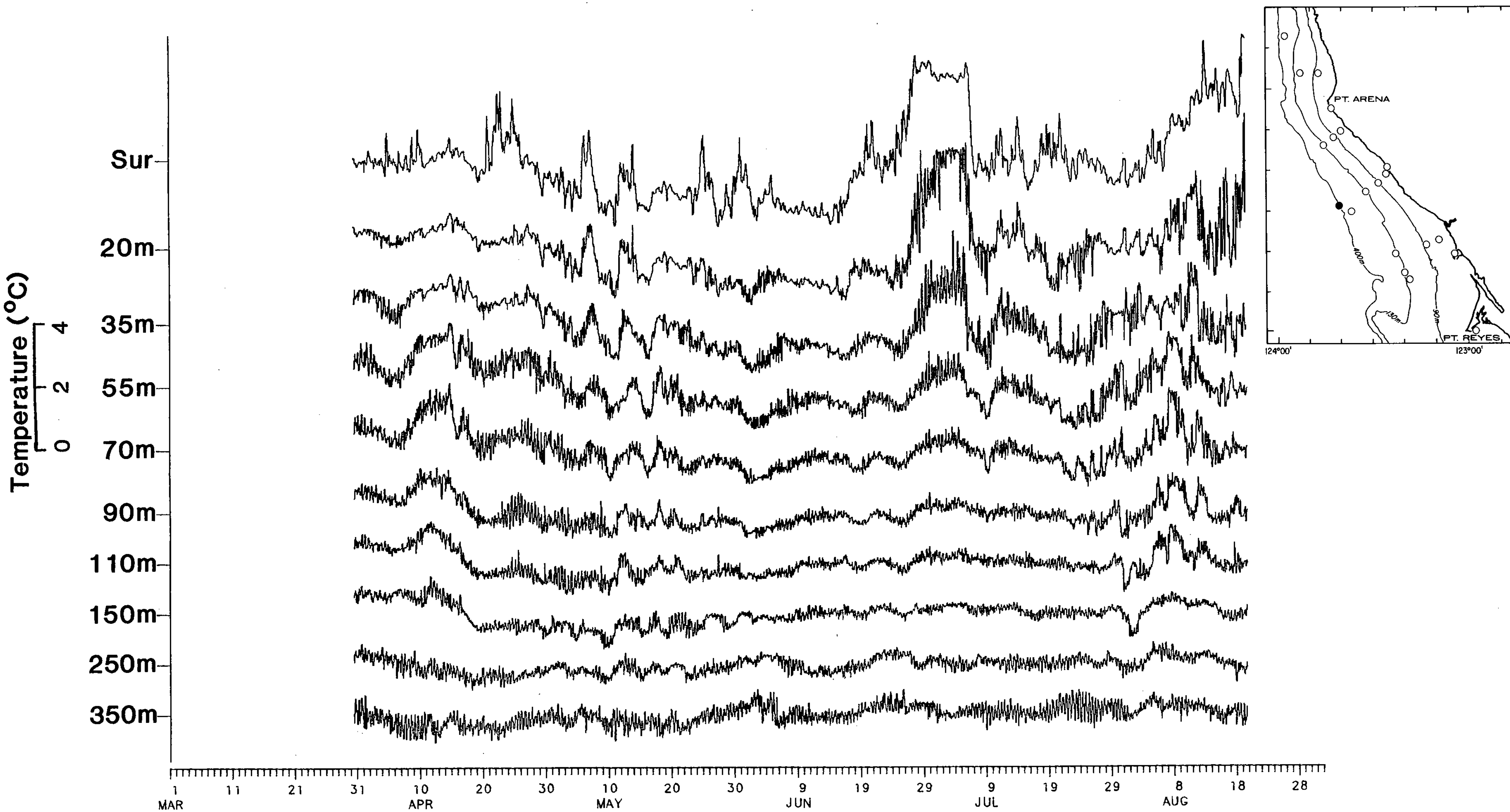
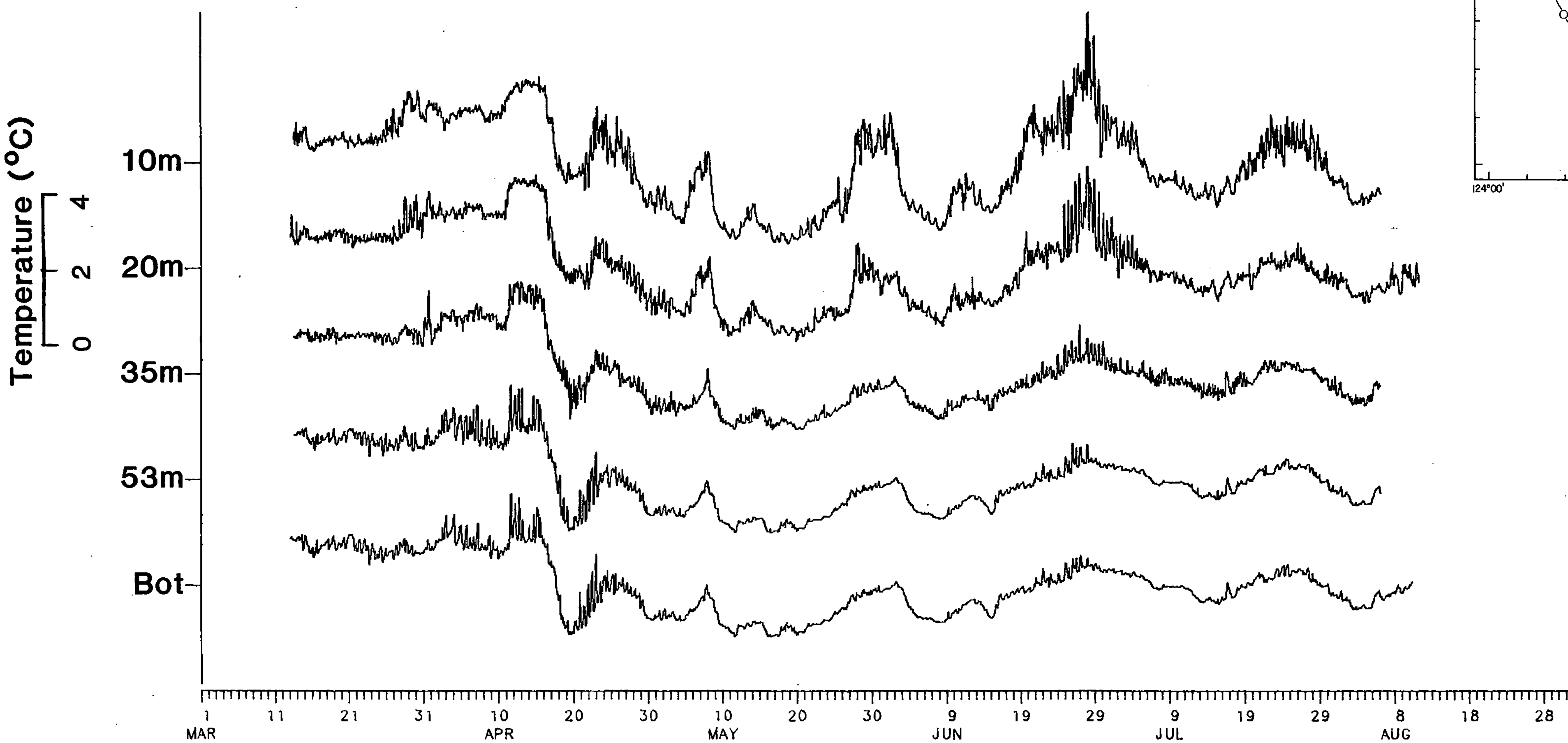


Figure 11: C5 temperatures. Each series is plotted relative to its mean value tabulated in Table 1 at the level marked by the tick on the vertical axis.



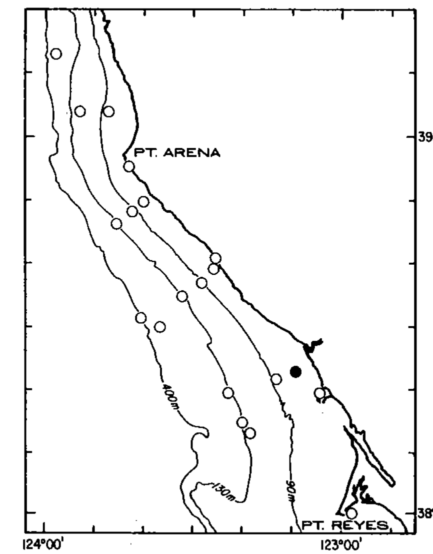


Figure 12: R2 temperatures. Each series is plotted relative to its mean value tabulated in Table 1 at the level marked by the tick on the vertical axis.

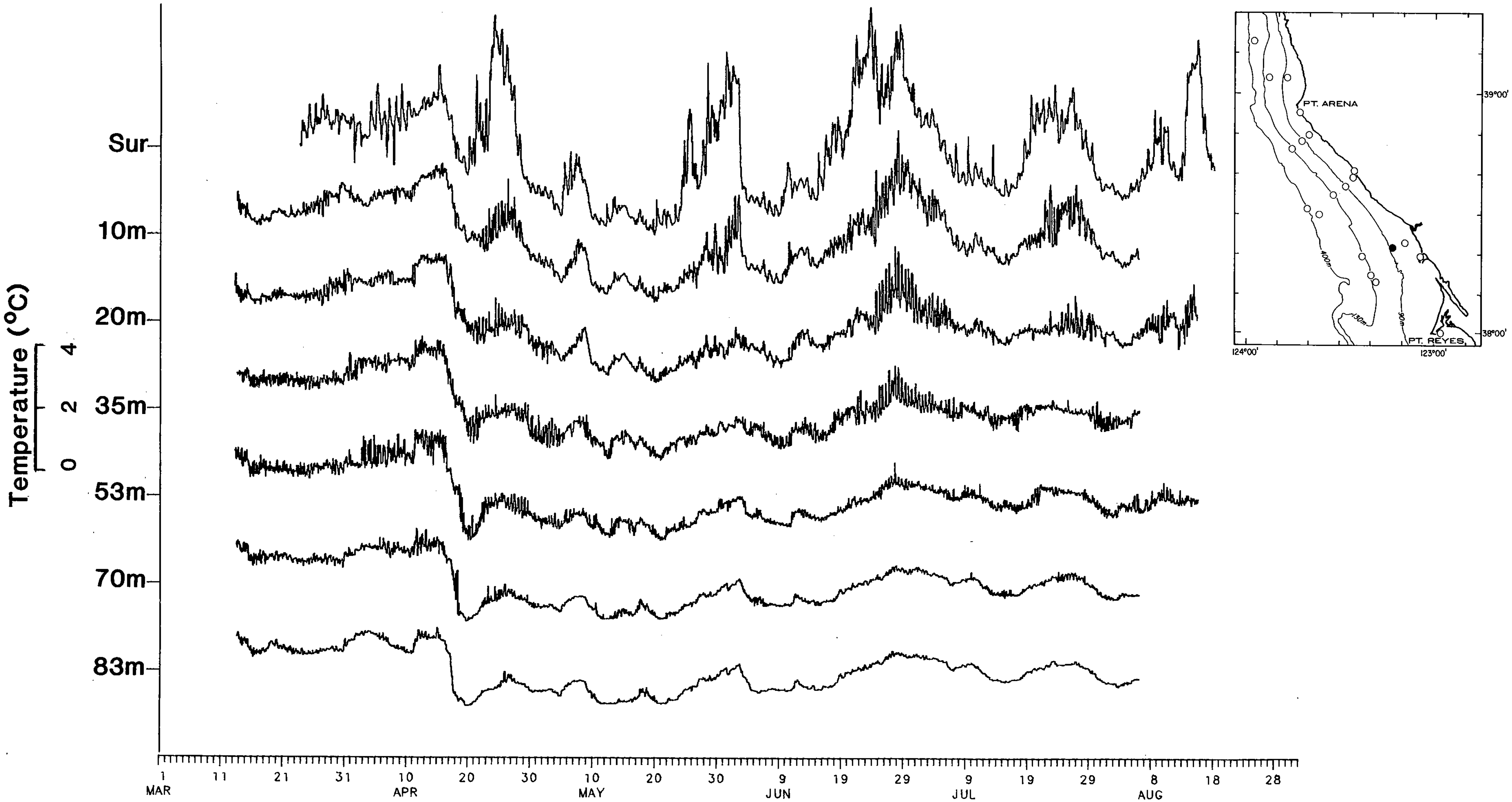


Figure 13: R3 temperatures. Each series is plotted relative to its mean value tabulated in Table 1 at the level marked by the tick on the vertical axis.

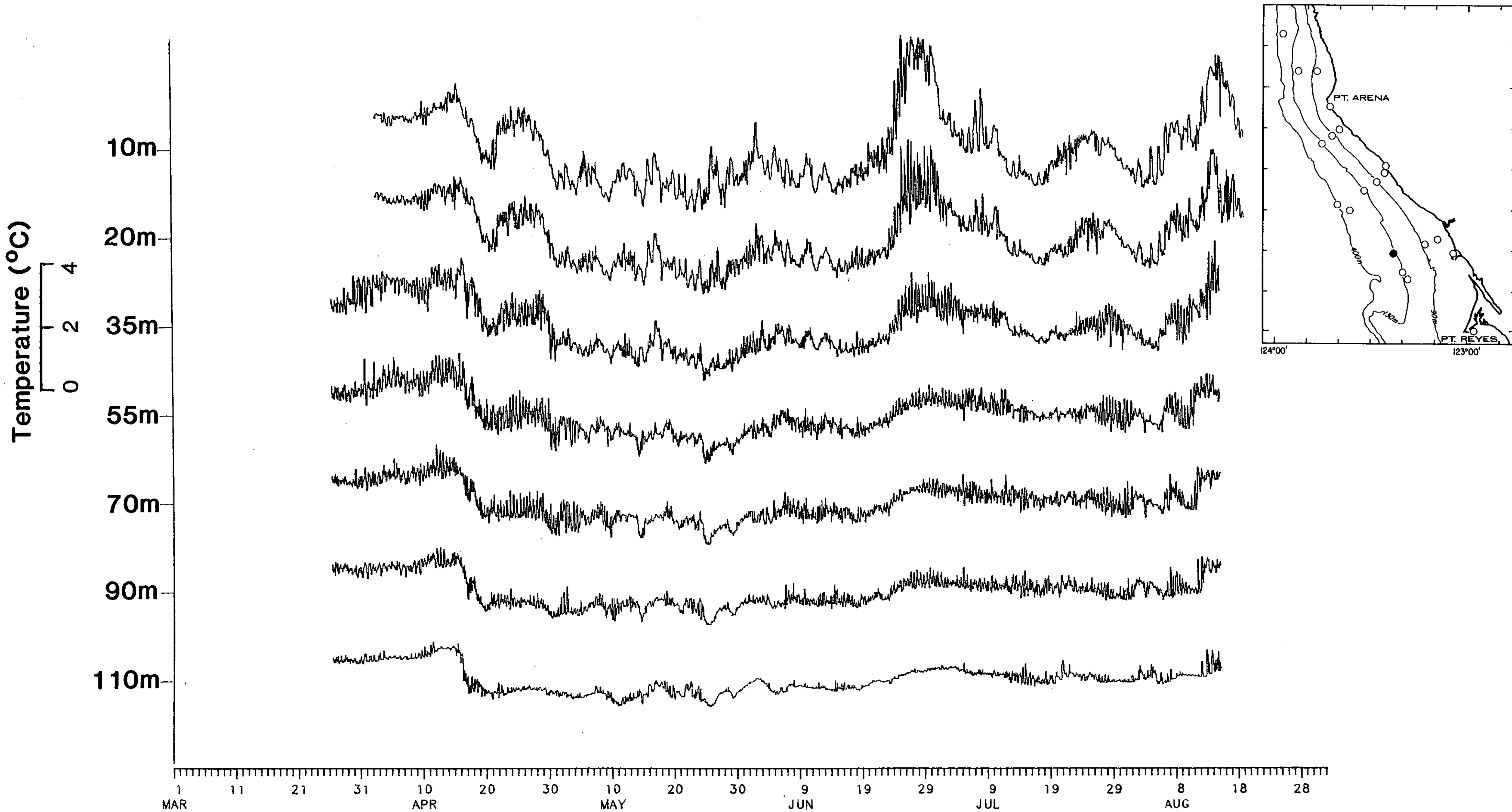


Figure 14: R4 temperatures. Each series is plotted relative to its mean value tabulated in Table 1 at the level marked by the tick on the vertical axis.

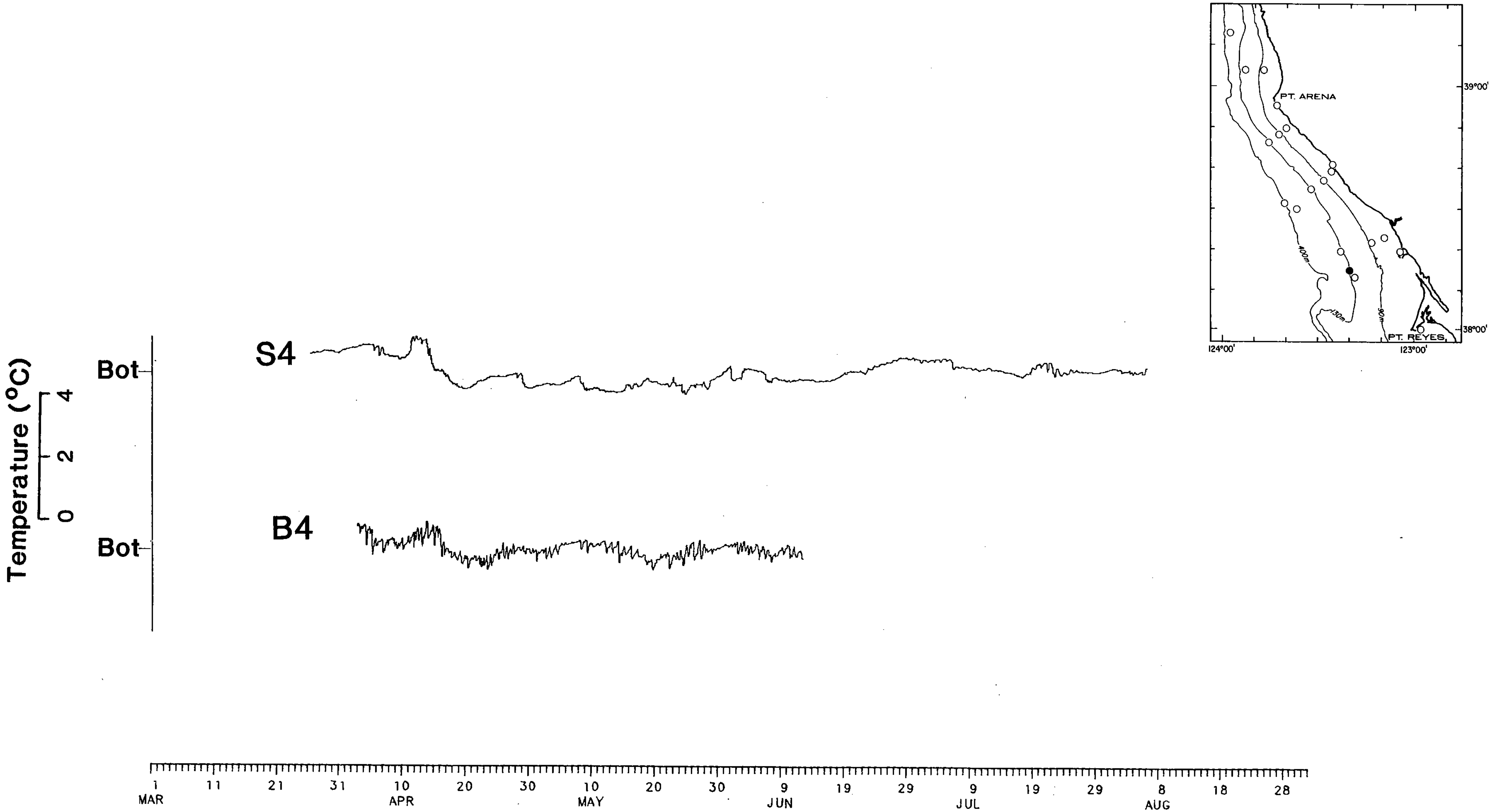


Figure 15: S4 and B4 bottom temperatures. Each series is plotted relative to its mean value tabulated in Table 1 at the level marked by the tick on the vertical axis.

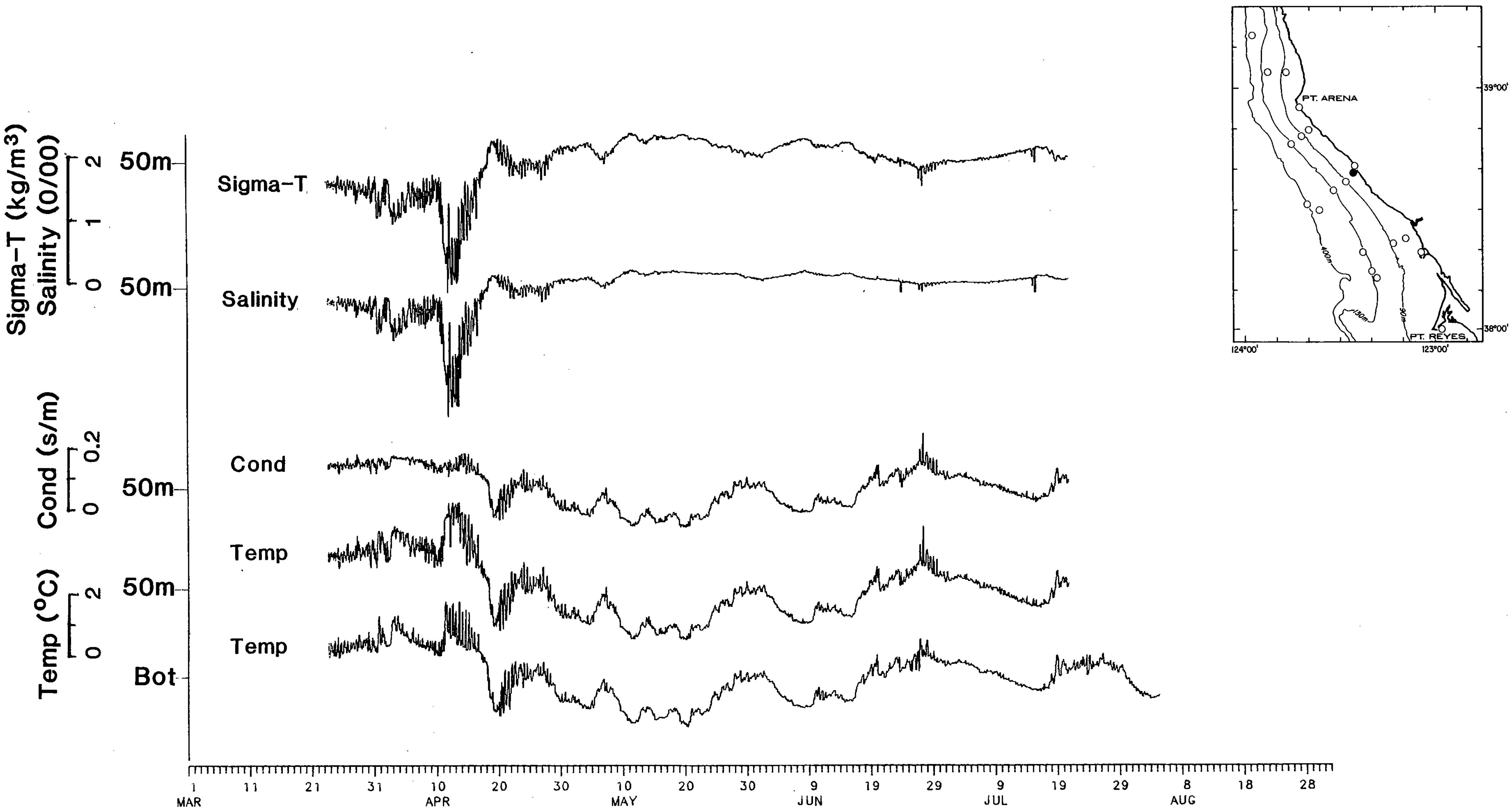


Figure 16: C2 moored density. Each series is plotted relative to its mean value tabulated in Table 2 at the level marked by the tick on the vertical axis.

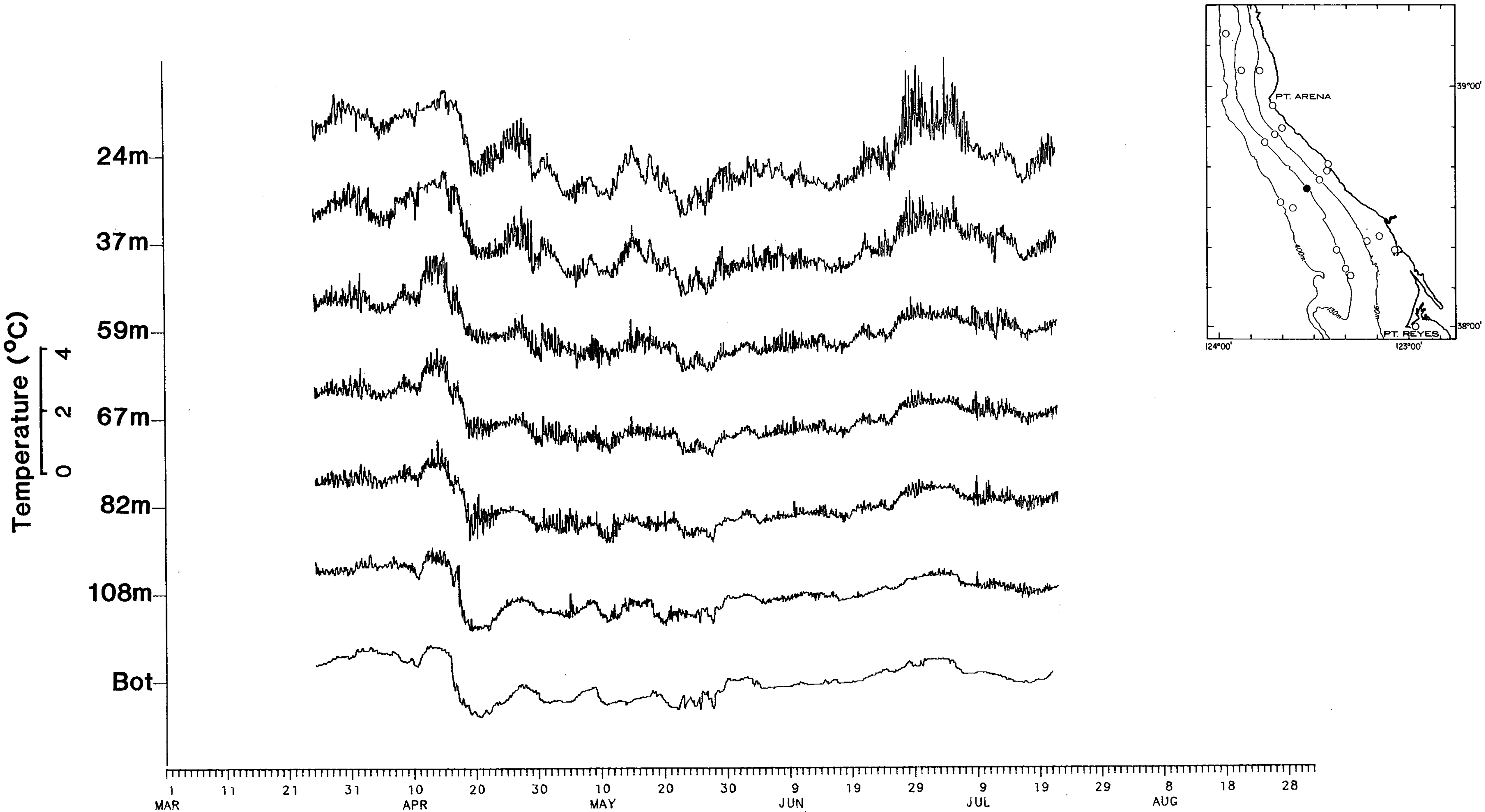


Figure 17: C4 moored density array temperature. Each series is plotted relative to its mean value tabulated in Table 2 at the level marked by the tick on the vertical axis.

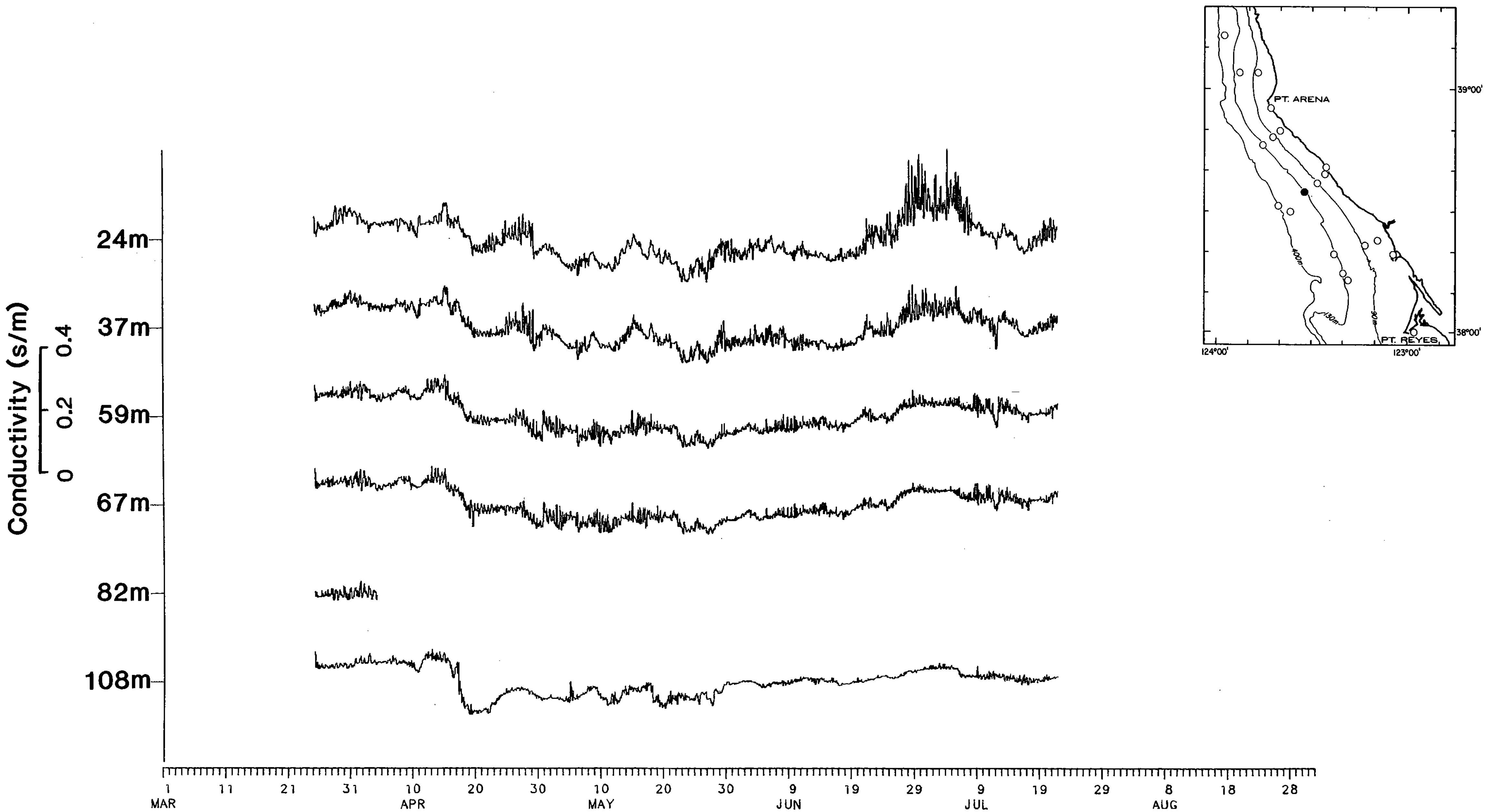


Figure 18: C4 moored density array conductivity. Each series is plotted relative to its mean value tabulated in Table 2 at the level marked by the tick on the vertical axis.

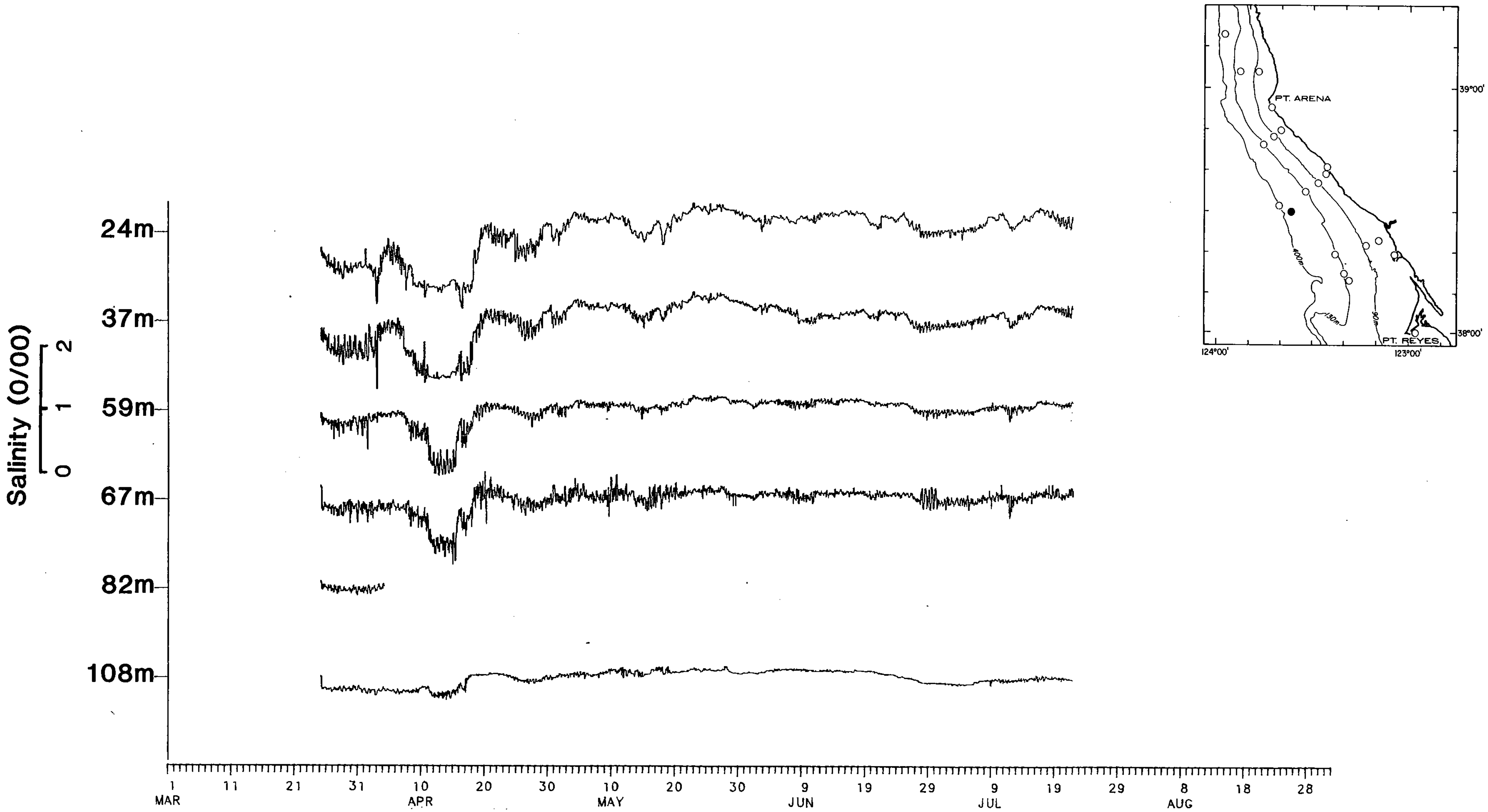


Figure 19: C4 moored density array salinity tabulated from the temperature and conductivity records shown in Figures 18 and 19. Each series is plotted relative to its mean value tabulated in Table 2 at the level marked by the tick on the vertical axis.

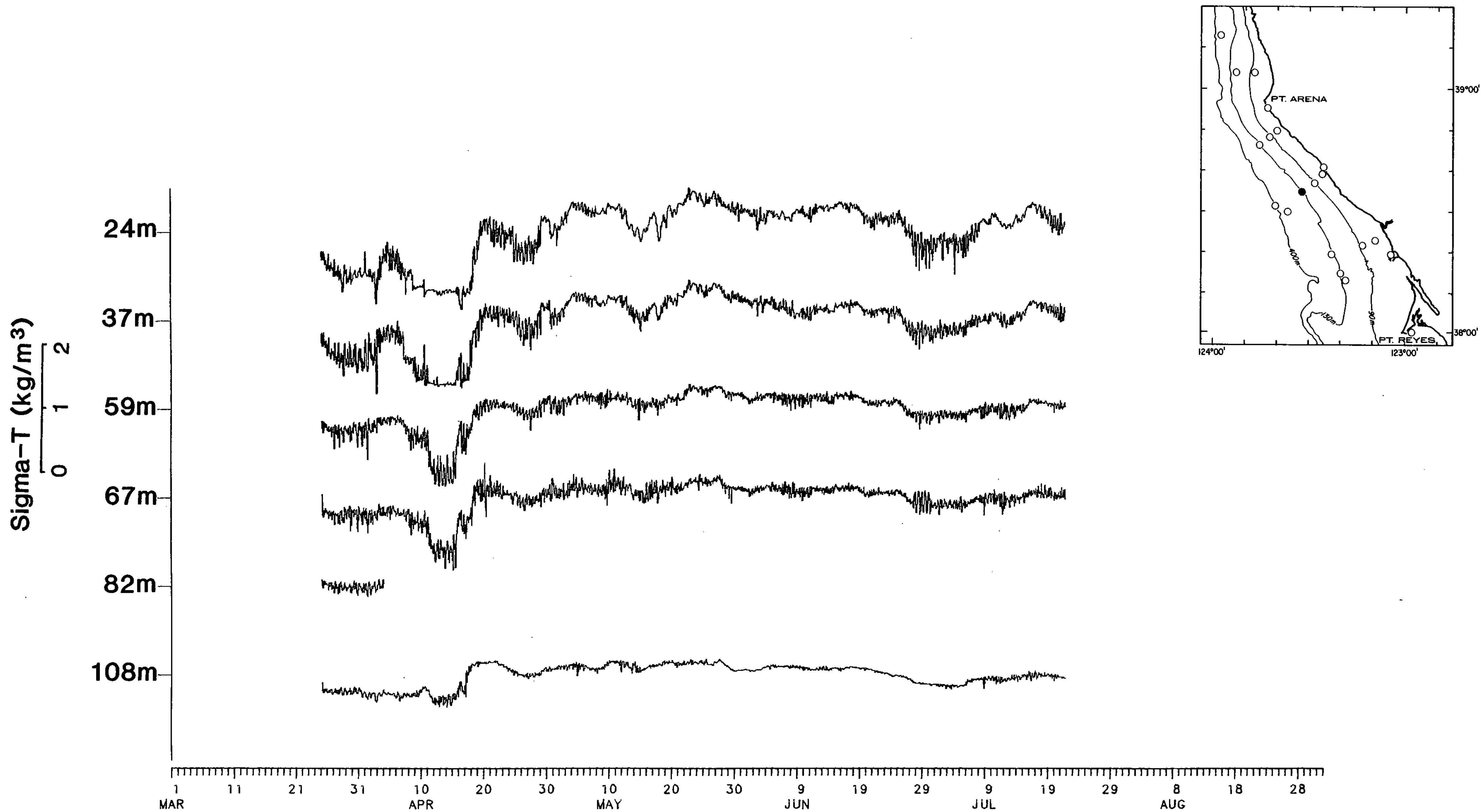


Figure 20: C4 moored density array density calculated from the temperature and conductivity records shown in Figures 18 and 19. Each series is plotted relative to its mean value tabulated in Table 2 at the level marked by the tick on the vertical axis.

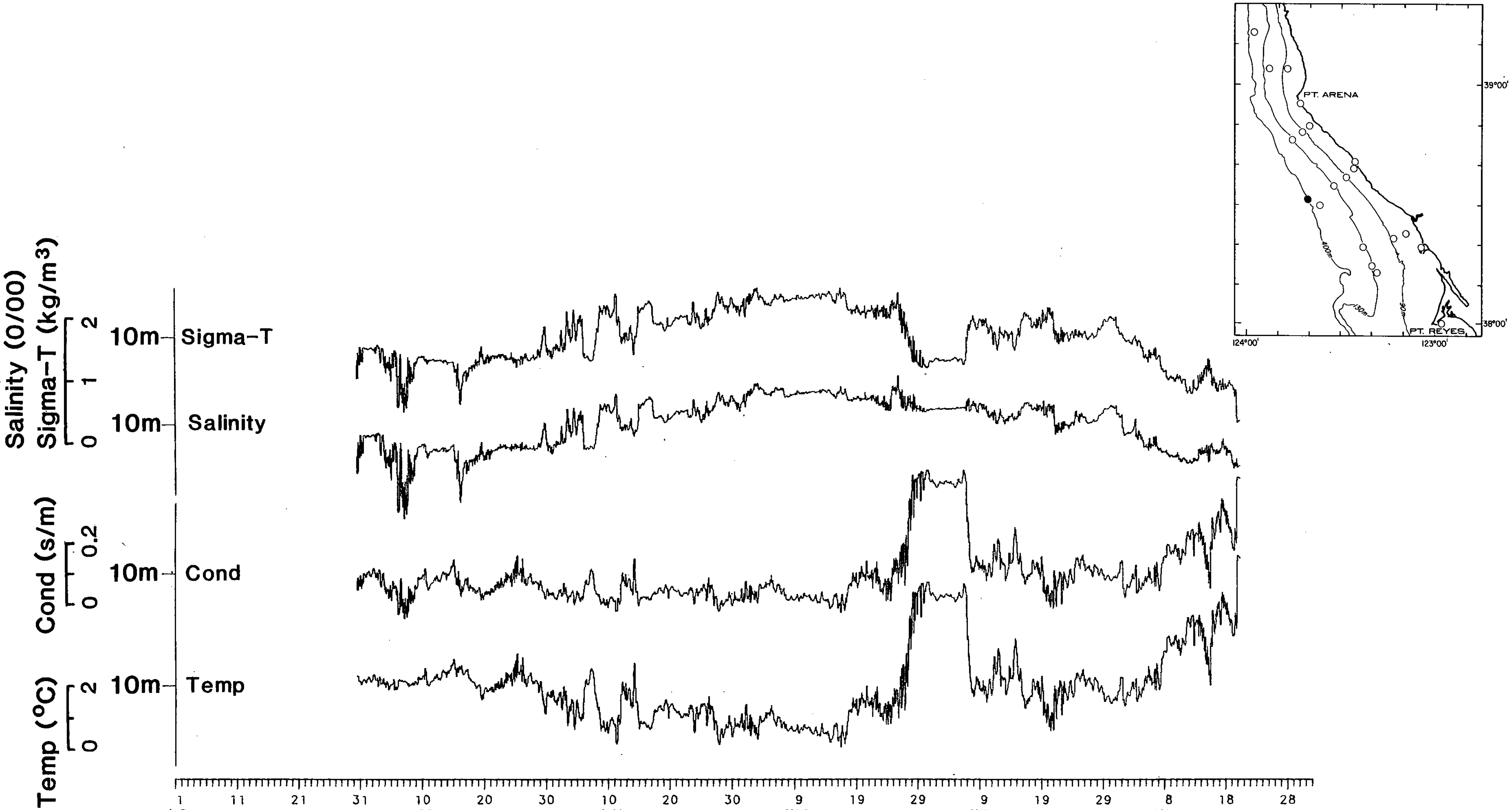


Figure 21: C5 moored density. Each series is plotted relative to its mean value tabulated in Table 2 at the level marked by the tick on the vertical axis.

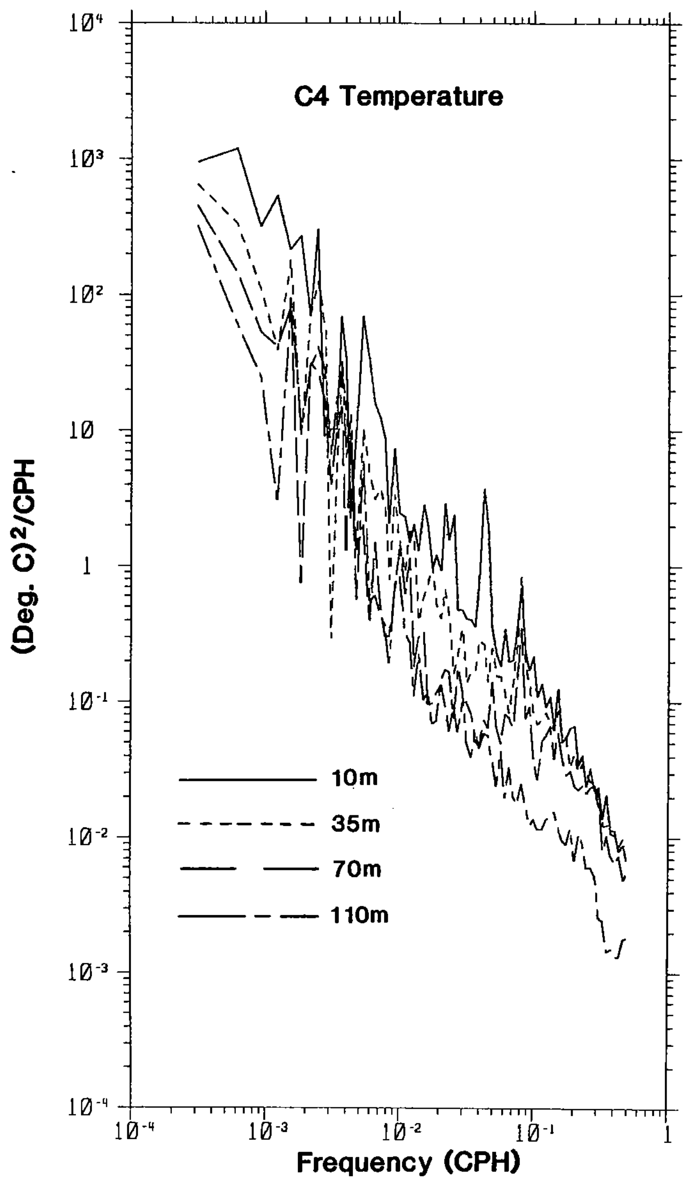


Figure 22: Temperature spectra from measurements at 35 meters depth along the CODE-2 central line. The frequency is expressed in cycles per hour, and spectral density in °C squared per cycle per hour. The spectra are log smoothed for plotting.

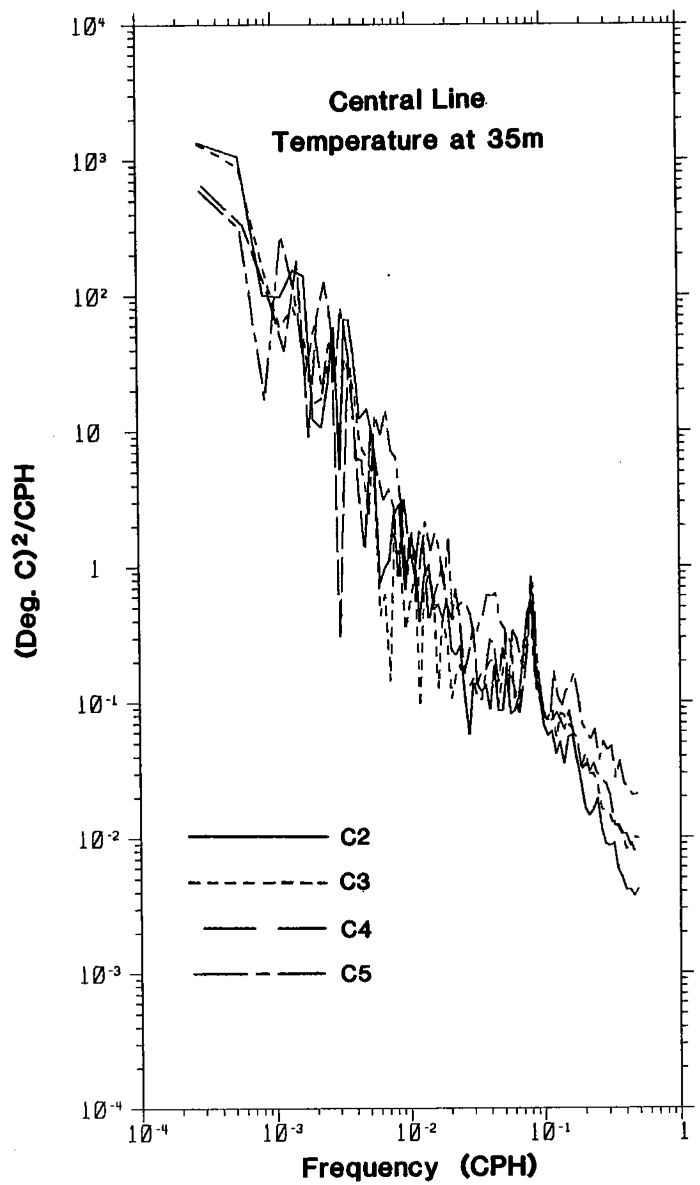


Figure 23: Temperature spectra from measurements at C4 during CODE-2. The frequency is expressed in cycles per hour, and spectral density in °C squared per cycle per hour. The spectra are log smoothed for plotting.

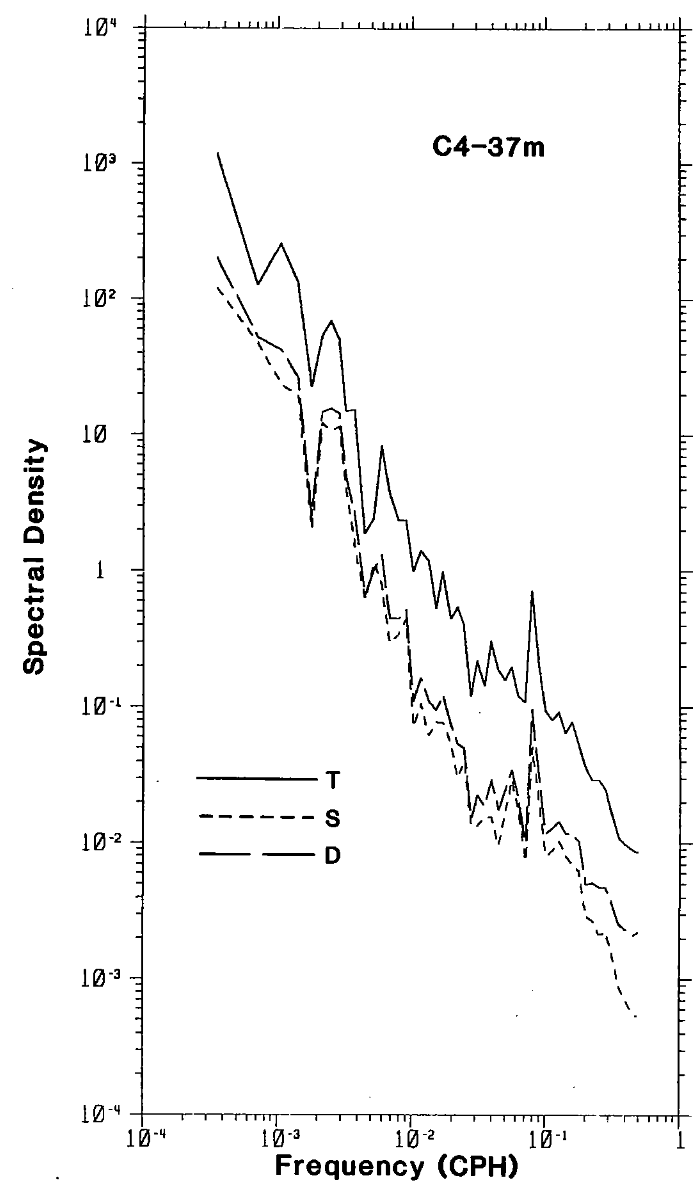


Figure 24: Spectral density from C4 at 37 meters depth. Spectra of temperature, salinity and density are plotted on the same scale. The temperature spectra are expressed in °C squared per cycle per hour salinity is expressed in parts per thousand squared per cycle per hour, and density in kilograms per cubic meter squared per cycle per hour. The frequency is expressed in cycles per hour, and the spectra are log smoothed for plotting.

CODE-2: BOTTOM PRESSURE OBSERVATIONS

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A. INTRODUCTION

This report describes the moored bottom pressure observations obtained during the second major field phase of the Coastal Ocean Dynamics Experiment (CODE-2) which took place along the northern California coast during the months of March through July, 1982. Although the CODE-2 array designs, shown in Figure 1, differed from those in CODE-1, the instrumentation and methodology was essentially the same, and so the reader is referred to Brown et al. (1983) for a description of the pertinent details. In what follows, we present a summary description of the CODE-2 bottom pressure data.

The CODE-2 bottom pressure array consisted of eight (8) elements (two of which failed) deployed by W. Brown, J. Irish from the University of New Hampshire (UNH), three (3) elements by C. Winant from Scripps Institution of Oceanography (SIO) and single (1) elements by D. Cacchione, U.S. Geological Survey, Menlo Park, CA (USGS) and N. Pettigrew, J. Irish from UNH at the stations identified in Table 1. As in CODE-1, all bottom pressure measurements were made with Paroscientific, Inc. sensors, although the UNH and SIO configurations were different as described by Brown et al. (1983) Additional bottom pressure observations were obtained as a second priority by the USGS using bottom stress instrumentation described by Cacchione and Drake (1979) and UNH using a bottom-mounted Doppler Acoustic Profiling Current Meter (DAPCM) as described by Irish et al. (1983).

B. DATA REDUCTION

Hourly values of the CODE-2 bottom pressure fluctuations are shown in Figure 2. The C4 record is from the UNH bottom instrument GERDA, which exhibited the effects of mooring motion in places, while a pair of shorter DAPCM pressure records, designated D1 and D2, are from the same location. As is our practice, the tides are predicted by harmonic analysis (see Table 2) and removed from each series before low-pass filtering (1/2 power at 44^h; 0.004 power at 24.39^h) to form the subtidal series as described in Brown et al. (1983) (see Figure 3). The harmonic constants compare favorably with previous CODE results.

Bottom pressure records are usually contaminated by (a) long-term secular drifts

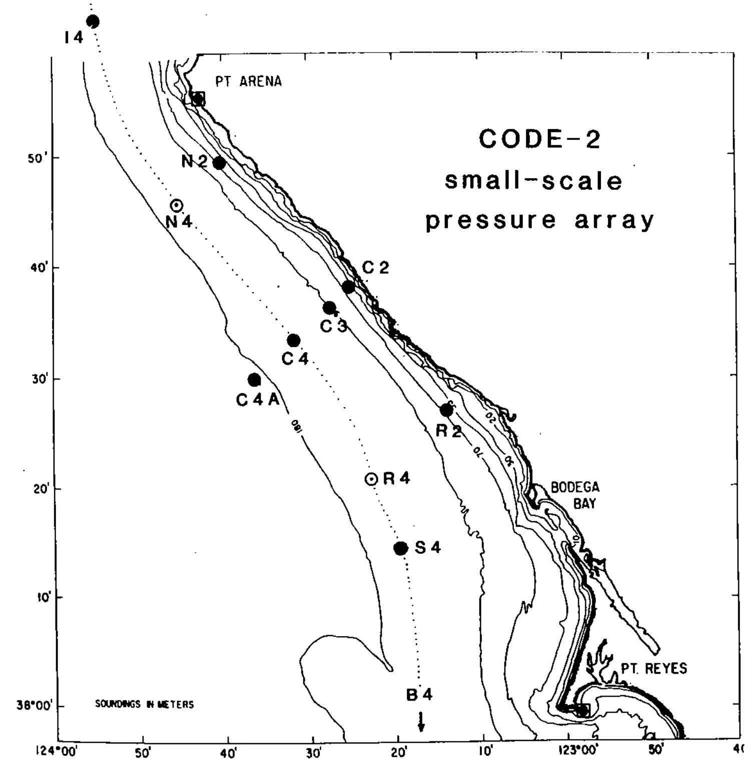

Figure 1. During CODE-2, bottom pressure observations were obtained at stations located by solid circles. Nearby sea level stations are located by blocked solid circles. Bottom pressure station B4 was located offshore from Half Moon Bay in 130 m and is not shown here. The open circles indicate the location of two UNH instruments that failed to record data.

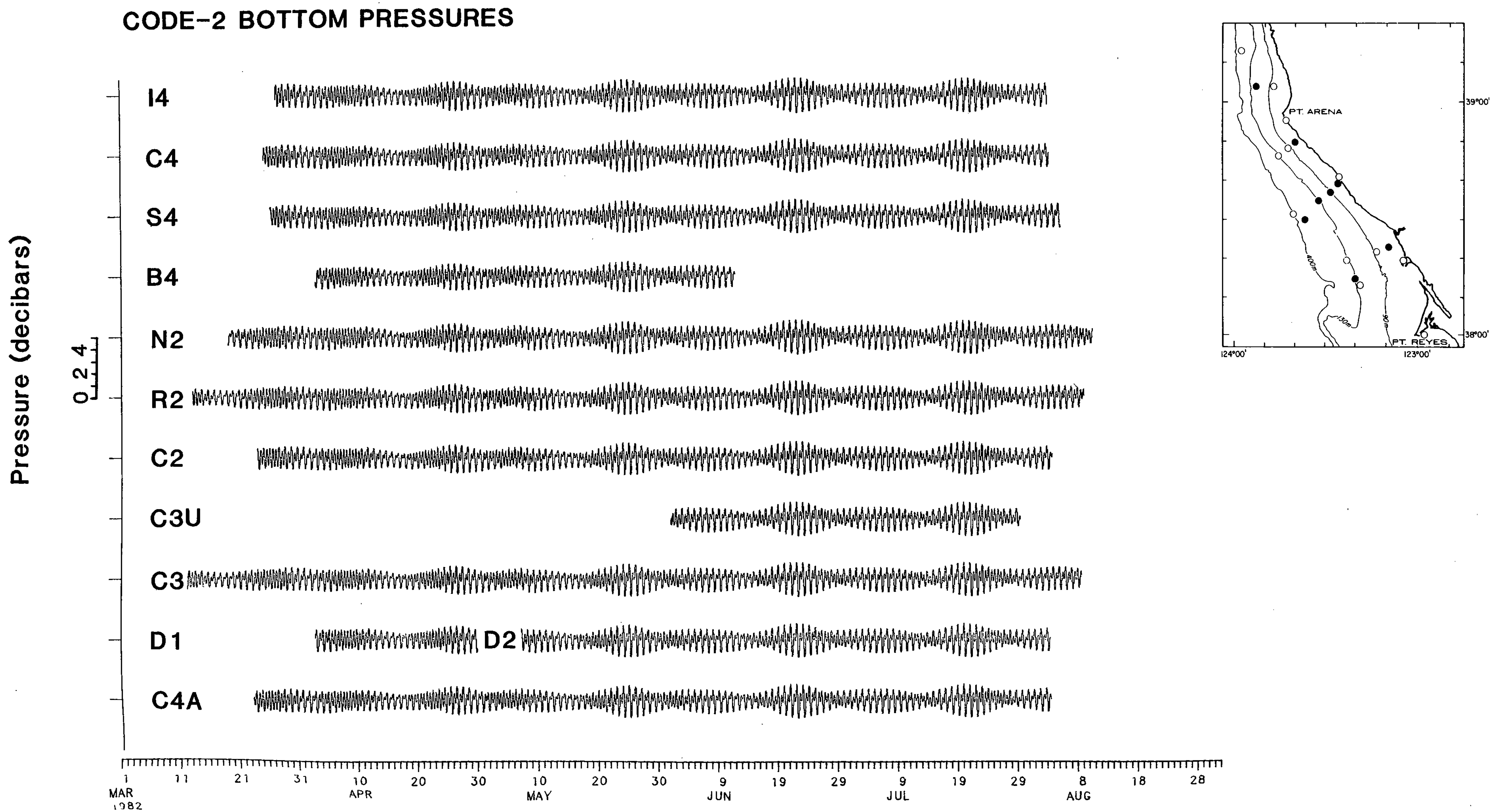

Figure 2. Hourly series are plotted relative to their mean values which have been removed.

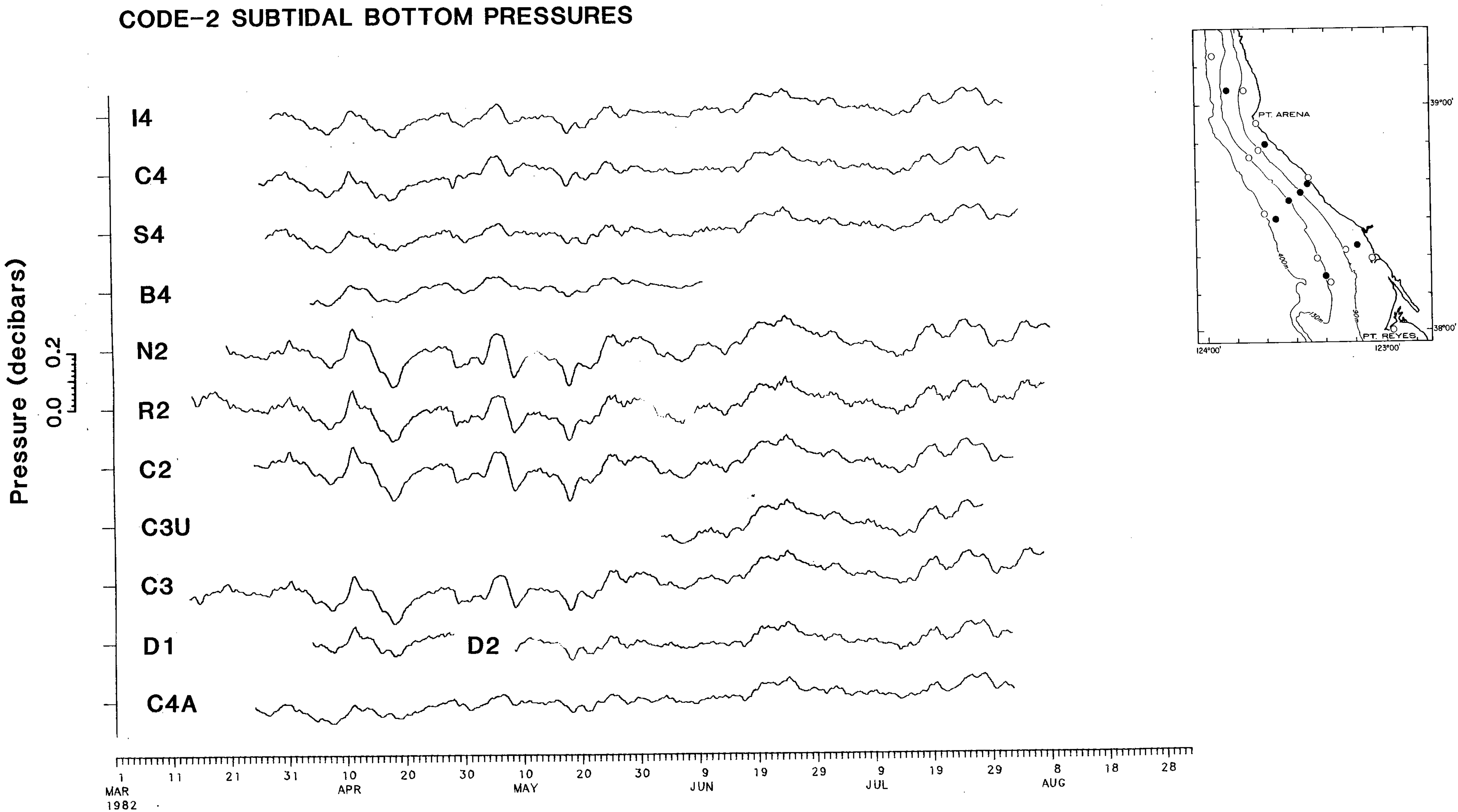

Figure 3. Six-hourly subtidal series are plotted relative to their mean values which have been removed.

TABLE 1: Bottom Pressure (db)

Station (ID) (Institution)	Latitude (N) Longitude (W)	Water Depth (m)	Start Time End Time (GMT)	Duration (Days)	Sensor Depth (m)	Mean	*Std Dev	*Maximum	*Minimum
B4 (VOGEL) (UNH)	37°17.08' 122°47.45'	125.1	02Apr82 18.0 12Jun82 3.0	70.42	125.06	125.75	0.500	1.175	-1.31
S4 (KIWI) (UNH)	38°14.22' 123°19.70'	131.7	26Mar82 6.0 05Aug82 15.0	132.42	130.73	131.45	0.534	1.294	-1.45
R2 (SIO)	38°27.14' 123°13.94'	60.4	12Mar82 6.0 09Aug82 12.0	149.60	130.73	131.45	0.534	1.294	-1.43
C2 (PICKET) (UNH)	38°38.20' 123°25.26'	61.4	23Mar82 16.0 04Aug82 2.0	133.46	60.43	60.76	0.532	1.310	-1.43
C3 (SIO)	38°36.39' 123°27.66'	90.5	12Mar82 3.0 9Aug82 0.0	149.92	89.50	89.99	0.520	1.313	-1.40
C3U (GEOPROBE) (USGS)	38°36.20' 123°27.71'	93.0	1Jun82 7.0 29Jul82 18.0	58.50	92.00	92.51	0.555	1.314	-1.47
C4 (GERDA) (UNH)	38°33.46' 123°31.53'	132.3	25Mar82 3.0 20Jul82 11.0	117.38	131.34	142.20	0.524	1.275	-1.44
C4 (DAPCM-1) (UNH)	38°33.19' 123°31.61'	132.3	02Apr82 8.0 29Apr82 11.0	27.46	133.45	144.32	0.512	1.099	-1.20

TABLE 1: Bottom Pressure (db) (Continued)

Station (ID) (Institution)	Latitude (N) Longitude (W)	Water Depth (m)	Start Time End Time (GMT)	Duration (Days)	Sensor Depth (m)	Mean	*Std Dev	*Maximum	*Minimum
C4 (DAPCM-2) (UNH)	38°33.19' 123°31.61'	132.3	07May82 4.0 03Aug82 17.0	88.58	133.40	144.27	0.543	1.291	-1.45
C4A (KELVIN) (UNH)	38°29.95' 123°36.30'	202.5	23Mar82 8.0 03Aug82 23.0	133.67	202.47	203.58	0.531	1.300	-1.43
N2 (SIO)	38°49.53' 123°40.25'	64.0	16Mar82 19.0 8Aug82 22.0	145.17	63.00	63.35	0.527	1.298	-1.42
I4 (SHELDRAKE) (UNH)	39°03.10' 123°55.11'	133.1	27Mar82 4.0 03Aug82 11.0	129.33	132.09	132.82	0.550	1.301	-1.50

*Each set of statistics includes maximum and minimum values (relative to the indicated mean value) and standard deviations of the hourly series.

TABLE 2:

The harmonic constants for the principal semidiurnal (M_2) and diurnal (K_1) constituents. The amplitude, A, is expressed in decibars, and phase is in Greenwich degrees, G. See Chapter 1, Table 2, for mooring locations.

HARMONIC CONSTANT LIST

Station	Depth (m)	Days	M_2 A	M_2 G	K_1 A	K_1 G
B4 (UNH)	125.1	70.4	0.521	187.5	0.368	221.0
S4 (UNH)	131.7	132.4	0.548	196.6	0.360	222.3
R2 (SIO)	60.4	149.6	0.551	197.2	0.380	226.5
C2 (UNH)	61.4	133.5	0.549	197.7	0.381	227.3
C3 (SIO)	89.5	149.9	0.551	197.5	0.369	225.7
C3U (USGS)	93.0	58.5	0.552	199.2	0.360	226.2
C4 (UNH)	132.3	117.4	0.549	193.7	0.351	221.3
C4 (UNH-DAPCM)	132.3	88.6	0.547	194.4	0.360	219.0
C4A (UNH)	202.5	133.7	0.547	193.6	0.358	221.2
N2 (SIO)	64.0	145.2	0.562	198.9	0.364	225.5
I4 (UNH)	133.1	129.3	0.577	201.3	0.362	223.2

(typically about 0.5 to 1.0 mb per month for the Paroscientific, Inc. sensors, due to creep in the bellows, as described by Wearn and Larson (1982), (b) long- and short-term noise due to the uncertainty in the temperature sensitivity of a pressure sensor plus temperature changes (Brown et al. 1983) and (c) long- and short-term noise due to gradual sinking of the instrument frame into a soft bottom or shorter-term movement of the instrument frame.

The long-term instrumental drift in bottom pressure records are usually of the same magnitude as natural geophysical trends as shown in Table 3, which compares trends on uncontaminated coastal synthetic subsurface pressure (SSP) records with the presumably contaminated CODE-2 bottom pressure records. While careful laboratory calibration of the sensors will permit the removal of the bellows creep, there are no fully objective methods for removing the other noise components in a bottom pressure record. However, less objective methods are available to partially correct for the long-term drifts in typical bottom pressure records that become especially troublesome when differencing individual records.

Offsets due to short-term instrument movement are usually correctable to within ± 0.25 millibars. as was the case for a 1.81 millibar offset in the station N2 record (due to a fishing trawler snag) at 1900 GMT 20 May 1982. In another case, current drag on the temperature/conductivity chain at C4 apparently caused some uncorrectable movement of the GERDA instrument frame, especially during periods of high flow. Fortunately, the bottom pressure records from the DAPCM deployments are available.

In order to produce a full length continuous record at station C4 a composite bottom pressure has been constructed using the DAPCM-1, DAPCM-2 and GERDA pressure records. The greatest difficulty in forming these composite records is determining the appropriate relative mean levels between records which have their individual drift (both instrumental and geophysical) characteristics. This problem is addressed with a method that assumes the geostrophy of along-shelf flow as demonstrated convincingly on the New England shelf by Brown et al. (1985) and is outlined as follows.

A continuous bottom pressure record, p_{C4A} (the KELVIN record from station C4A in this case is chosen for a reference and is differenced with the components of the composite pressure record p_{C4i}. Then the mean value and the series-length trend (only!) of p_{C4i} are forced to be geostrophically consistent with the mean value and trend (only!) of the near-bottom along-shelf flow, V, according to

$$p_{C4i} - p_{C4A} = \rho f \int_{x_{C4A}}^{x_{C4}} v \, dx = \rho f \Delta x \bar{v} ,$$

where the across-shelf integral of the along-shelf current is estimated by averaging observed currents, ρ and f are density (1.025 gm/cm^3) and Coriolis parameter respectively, and $\Delta x = x_{C4} - x_{C4A}$ is the across-shelf separation between stations C4 and C4A. The pieces of the composite series, with times indicated in Table 4, were then joined to form the continuous series at C4.

The standard deviations for the CODE-2 subtidal pressures (including the C4 composite) for the period 3 April to 30 July 1982 are contoured in Figure 4. Like the comparable picture in Brown et al. (1983)

TABLE 3:

First-order trends in the CODE-2 bottom pressure series for the period 3 April to 30 July 1982. The trends for the Arena Cove and Pt. Reyes synthetic subsurface pressure are also presented. Units are millibars per 730.5-hour month.

Station	Trend (mb/mon)
C2	2.80
C3	2.67
C4	2.48
C4A	2.24
N2	2.12
R2	2.14
I4	2.08
S4	2.01
Arena Cove	0.65
Point Reyes	0.97

TABLE 4:

Times (GMT) and dates of the components of the composite C4 bottom pressure series.

GERDA-1	1200	1 April	0700	2 April
DAPCM-1	0800	2 April	1100	29 April
GERDA-2	1200	29 April	0300	7 May
DAPCM-2	0400	7 May	1200	1 Aug

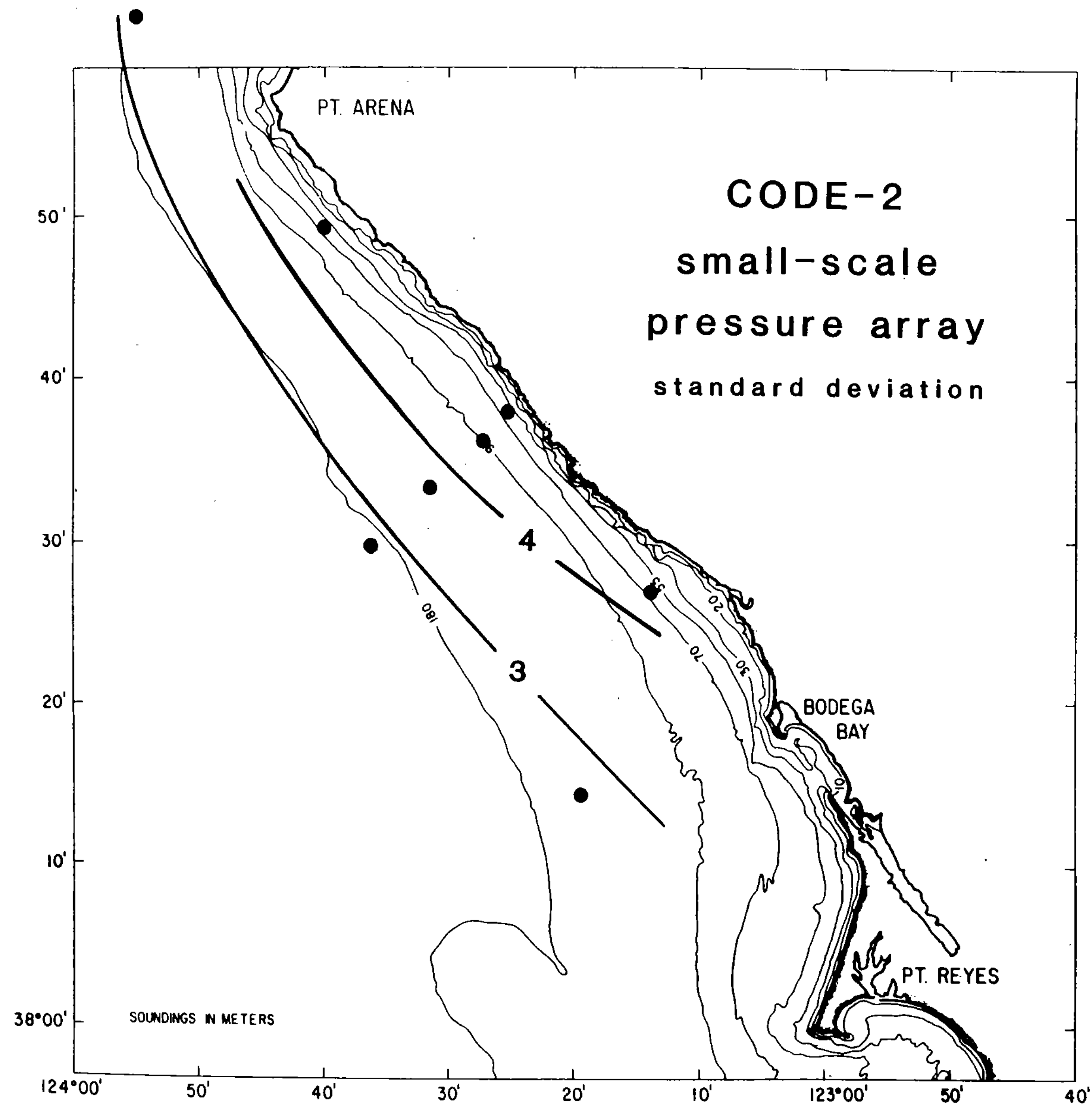

Figure 4. A contour plot of the CODE-2 small-scale array subtidal bottom pressure standard deviations in units of millibars. The results from B4 are not included.

this presentation shows a coastal trapped subtidal pressure with additional intensification along the coast near Pt. Arena and offshore in the vicinity of C4. Because phase differences between pressures are generally small in comparison to the characteristic fluctuation period, this presentation also permits crude estimates of the fluctuating bottom pressure differences to be made.

The energy density spectra from an alongshelf and an across-shelf array of bottom pressures are compared in separate presentations in Figure 5. The similarity between observations in the diurnal and semidiurnal frequency bands is indicative of tides with scales much larger than those of the CODE small-scale array. At subtidal frequencies these results show both a relative intensification at mooring C4 along the 130 m isobath and the expected offshore attenuation in the bottom pressure signal.

C. PRESSURE DIFFERENCES

The differences between separate pressure observations are used to compute representative pressure gradients for CODE-2. The spectra of a representative sample of

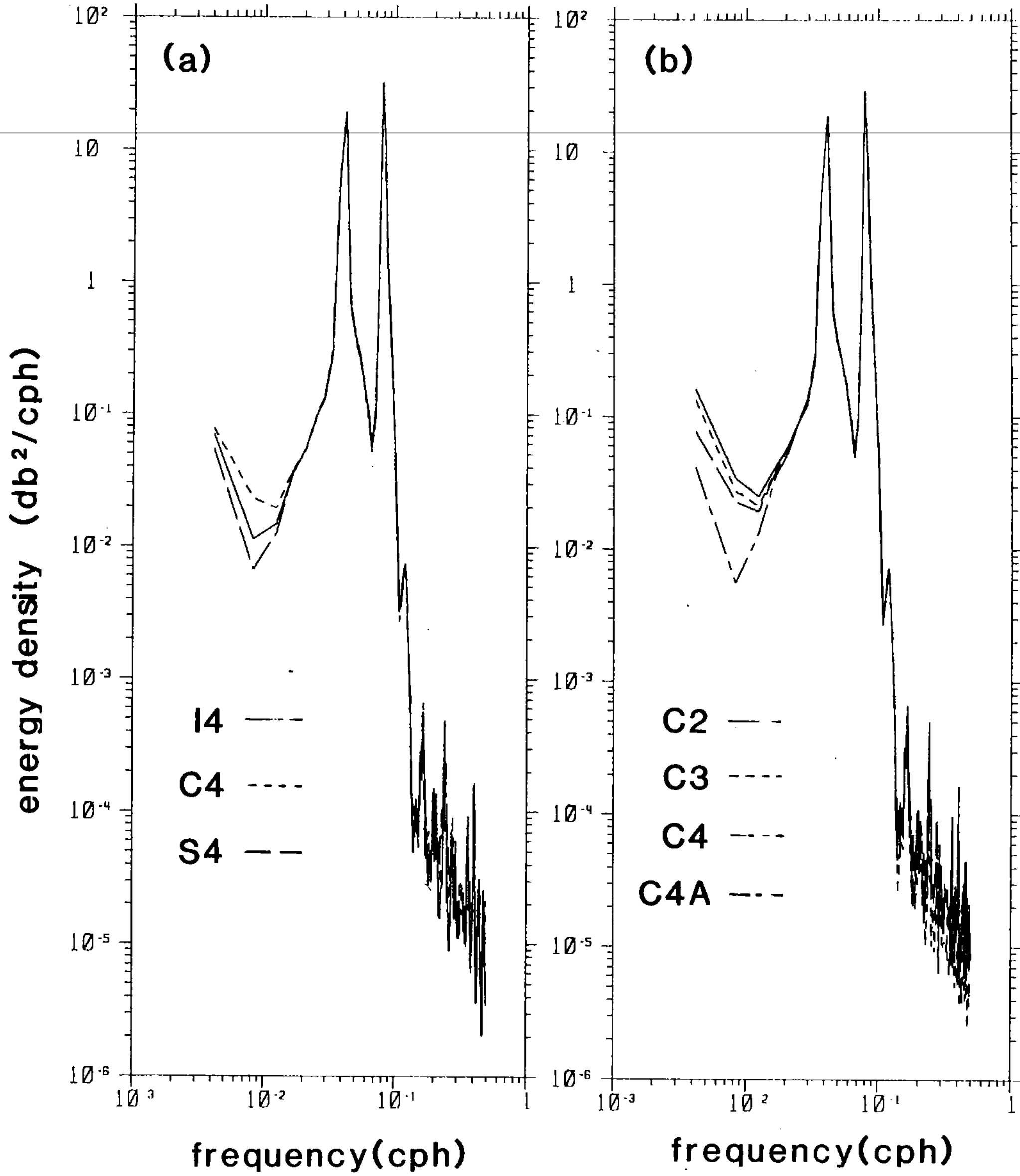

Figure 5. A comparison of energy density spectra from the 130 m set of bottom pressures in (a) emphasizes a near-uniformity in the tidal bands with the intensification of the station C4 subtidal pressures relative to those at I4 and S4. A comparison of CODE-2 central line pressure spectra in (b) shows the same across-shelf uniformity in tidal-frequency pressure energy while the subtidal pressure field is clearly trapped within the 150 m isobath.

CODE-2 subtidal pressure differences are compared in Figure 6 with each other and an estimate of instrument noise. (The spatial separations between these pairs of stations used is presented in Table 5.)

The spectral intercomparison shows that the CODE-2 across-shelf pressure differences are about an order of magnitude more energetic than along-shelf pressure differences. The comparison also shows that the along-shelf pressure difference spectra (except C2-R2) are generally above the expected instrumental noise spectrum. Overall pressure difference instrumental noise is estimated from long-term observations from several dual pressure sensors on the same bottom mooring and pairs of observations made on different moorings at the same site (zero separation). The interpretation of the difference between these dual observations in terms of overall instrumental noise is discussed more thoroughly by Snodgrass et al. (1975).

The pressure differences are used to compute the average pressure gradients Px (and Py) in the across-shelf (and along-shelf) direction(s) according to

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TABLE 5:

Representative CODE-2 pressure station across-shelf (Δx) and alongshelf (Δy) separation distances.

	Δx (km)
C2 - C3	4.84
C3 - C4	7.81
C4 - C4A	9.50
	Δy (km)
I4 - C4	64.67
C4 - S4	39.54
N2 - C2	30.23
C2 - R2	26.27

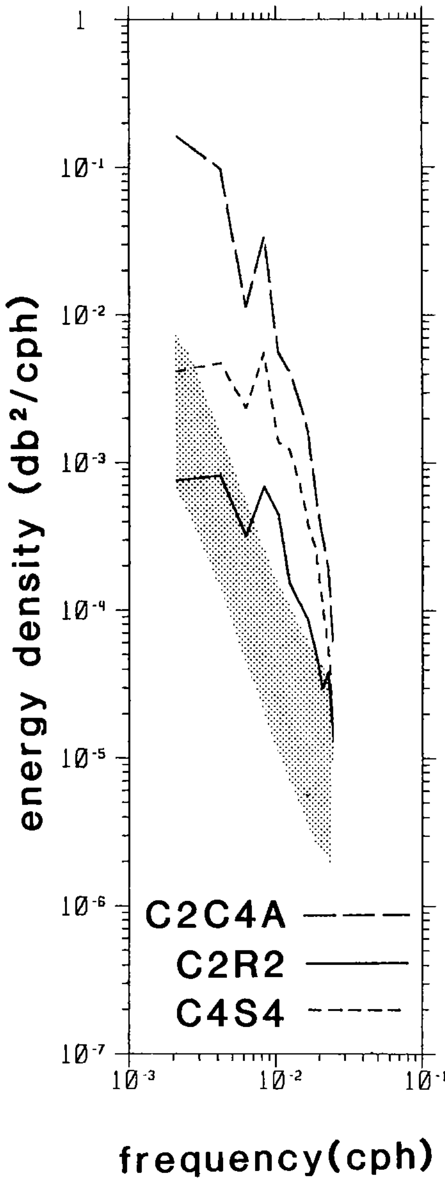


Figure 6. A comparison of energy density spectra of subtidal bottom pressure differences for the station pairs indicated. The stipled area is the estimated noise spectra for two pressure observations with no separations.

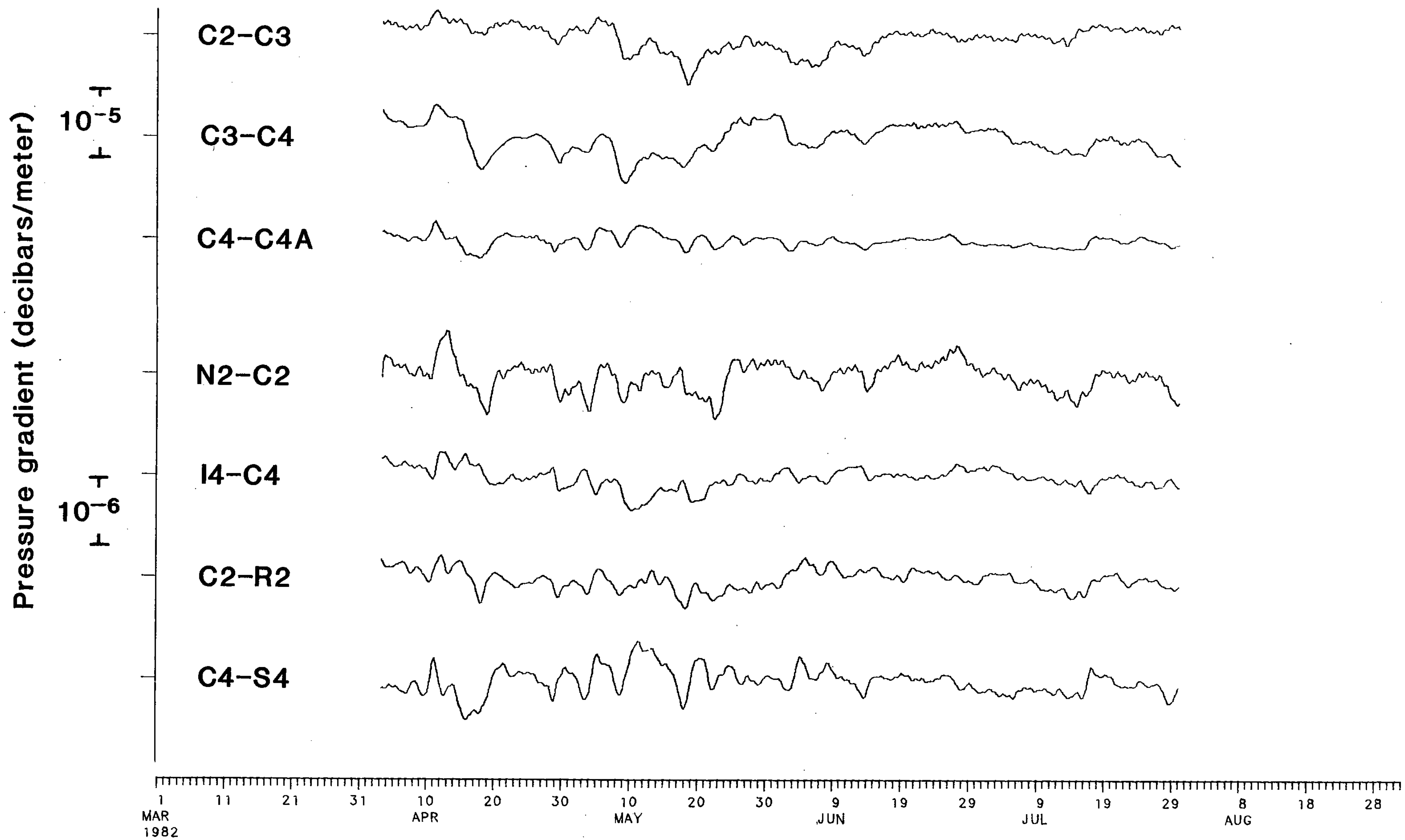
$$p_x = \frac{1}{x_2 - x_1} \int_{x_1}^{x_2} \frac{\partial p}{\partial x} \, dx = \frac{p_b(x_2) - p_b(x_1)}{x_2 - x_1},$$

where $p_b(x_1)$ and $p_b(x_2)$ are the bottom pressures at across-shelf locations x_1 and x_2, respectively. A list of representative station separations is presented in Table 5, and the corresponding pressure gradients are plotted in Figure 7. Note the different scales for the across and alongshelf gradients in Figure 7. The mean values and trends of these pressure gradient series have been removed because the differential trend errors (see discussion above) are large enough, especially in the case of the along-shelf gradients, to distort the subtidal frequency fluctuations.

Acknowledgments

The execution of the CODE-2 pressure field program was made possible through the efforts of a great many people. At UNH, the extraordinary efforts of Jim Irish,

CODE-2 SUBTIDAL PRESSURE GRADIENTS



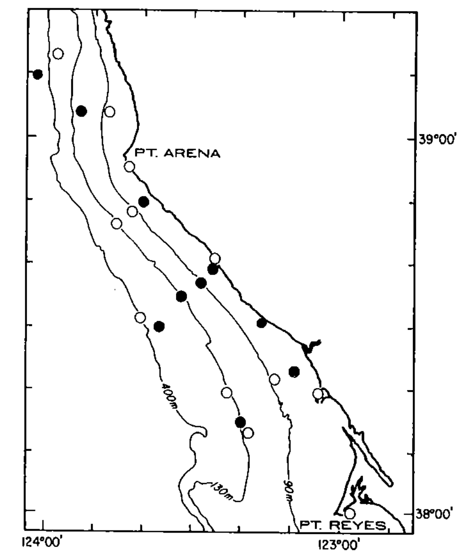


Figure 7. A comparison of subtidal across-shelf and along-shelf pressure gradients. Note the different scales for the two sets of gradients.

Neal Pettigrew, Ed LaCoursiere and Tom Howell are noteworthy. The corresponding contributions by Scripps personnel including Clint Winant, Mike Kirk, Phil Dacri, Al Bratkovich, and Steve Lentz are equally noteworthy. Without their dedication and versatility, this level of effort would not have been possible. The skill and cooperation of the officers and crew of the R/V Wecoma (OSU) helped make our seagoing operations possible and productive. The officers and crew of the U.S. Coast Guard Base at Yerba Buena Island were a key factor in the efficiency and flexibility with which we were able to execute the CODE field effort such long distances from our home base. We also make special mention of the assistance of Mariellen Lee (UNH), who arranged much of the logistics and acted as the onshore liaison. The UNH and SIO efforts were supported under NSF grants OCE 80-14940 and OCE 80-14942, respectively.

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CODE-2:
LARGE-SCALE WIND AND SEA LEVEL OBSERVATIONS

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A. INTRODUCTION

The purpose of the large-scale component of CODE is to study the large-scale response of shelf circulation to atmospheric forcing. Using sea level as an indicator of the response, models of wind-driven shelf circulation can be tested, and currents measured at the CODE site can be related to non-local atmospheric forcing and the propagation of free coastally trapped waves through the site. This effort requires good wind and sea level data to be obtained for a sufficiently large alongshore domain containing the CODE site. Atmospheric pressure is also obtained to barometrically adjust sea level; air and sea surface temperatures are obtained from all offshore buoys. To properly assess non-local forcing of shelf currents at the CODE site, the large-scale analysis domain extends equatorward to central Baja California, 1800 km from the site. In order to provide a sufficiently large alongshore domain to resolve long coastally trapped waves in our analyses, the domain extends poleward to the Alaskan border, more than 1800 km from the CODE site.

The most intensely sampled time period is from 1 December 1980 through 30 November 1982, but data from many stations will extend from 1 April 1980 through mid-1984 to completely span the 1982-83 El Nino event in time. Only wind and sea level data from the six-month subset of March through August 1982 will be presented in this report for comparison to the other CODE-2 data sets.

To properly assess the response of sea level and currents to wind forcing, the best possible sets of winds must be obtained. There are four wind sets which can be used in the present study: measured winds and three calculated wind fields. These calculated fields are (1) Bakun winds from Fleet Numerical Oceanography Center (FNOC), Bakun (1973); (2) marine winds from FNOC, Caton et al. (1978); and (3) six-hour forecast winds from the National Weather Service Limited Fine Mesh II (LFM-II) model, Newell and Deaven (1980) and Gerrity (1977). (Different boundary layer corrections are applied to the Bakun and marine winds at FNOC.)

Ideally, measured winds should be used, and a large number of wind measurement stations exist along the West Coast of the U.S. However, topographic influences and data gaps are problems at many of them. This requires that winds be collected from as many locations as possible both to find enough good quality winds to provide adequate alongshore resolution, and to find enough backup stations to fill the gaps in the primary stations. Calculated wind fields are an attractive alternative since they do not have these problems. These winds are presently being compared to measured winds to determine if they adequately represent the large-scale atmospheric forcing along the West Coast. Halliwell and Allen (1984) show that Bakun winds provide a fairly adequate representation of the large-scale wind forcing field during summer if an additional boundary-layer correction (rotation only) that is a function of alongshore position is applied. Vector plots are also presented in this report for comparison to the measured winds.

This report is organized as follows: The stations and variables in the data base are described in Section B.1, and the editing and processing are presented in Section B.2. The wind and sea level data are discussed in Sections C and D, respectively. This is essentially the same format used in the

CODE-1 large-scale data report (Halliwell and Allen, 1983).

B. THE LARGE-SCALE DATA BASE FOR THE CODE-2 EXPERIMENT

B.1 Description of the Data Base

Information on measured wind stations is summarized in Table 1. Only the measurement stations with data available during the CODE-2 experiment are included. The locations of these stations are shown in Figure 1. Information on the CODE analysis grid is presented in Table 2. Time series from the calculated wind fields are obtained at these points. The locations of these points are shown in Figure 2. The alongshore separation of adjacent coastal grid points is 180 km, sufficient to resolve the smallest spatial scales in the LFM-analyzed wind fields. Information on sea level stations is summarized in Table 3, and their locations are shown in Figure 3. Atmospheric pressure stations (Bakun only) used to adjust these sea level time series are also listed in Table 3.

Alongshore position is determined as follows: The CODE central line is assigned a position of 0 km, with alongshore distances poleward of this line assigned positive values. In determining alongshore distances, small headlands and bays (< 20 km) are first visually smoothed.

B.2 Data Editing and Processing

Assembling the CODE large-scale data base from many diverse sources requires considerable effort to edit and process the data. Characteristics of source meteorological data and analyzed meteorological fields are summarized in Table 4. (Important abbreviations in this table are listed and explained at the bottom of the table.) Only winds are routinely processed at all stations. In addition, atmospheric pressure is processed at many measurement stations and CODE grid points for the calculated pressure fields. Air and sea surface temperatures are processed at all offshore buoys, and calculated wind stress curl is processed for Bakun data. Variables received from all sources that were not processed are also listed in Table 4.

The basic editorial procedure is as follows:

1. Transcribe manuscript data or teletype output onto computer coding forms, then keypunch if required.
2. Read source magnetic tapes or computer cards into the computer. If for a given time series no source data are available at a given sample time, a missing data spacer (the number 10^{35}) is stored for that time.
3. Wind speed is adjusted to anemometer height of 10 m assuming neutral stability. The correction factor is a function of wind speed and anemometer height as contoured in Figure 4.
4. Convert source winds to u and v components.
5. Convert all variables to common units (mb for pressure, m/s for wind and deg C for temperature).
6. Check for physically unrealistic data values for each variable. If any exist, replace these values by a missing data spacer.
7. Search for unusual data jumps or spikes by flagging all points in a time series that differ from either the point before or after it by more than three times the standard deviation of all first-differences. Determination of whether these data jumps are due to one or more bad data values is made by visual inspection of each flagged point with nearby points in the series. If a point is determined to be bad, it is replaced by a missing data spacer.
8. All short data gaps ($\leq$ 12 hrs in length) are filled using linear interpolation. The missing data spacers in these gaps are replaced by interpolated data.

TABLE 1: Meteorological Station Information

Station	Abbreviation	Latitude (Deg Min)	Longitude (Deg Min)	Data Processed Pr	Wind	AT	ST	Alongshore Position (km)	Elevation (m)	Anemometer Height (m)	Coast Orientation (Deg)	Period of Record
Prince Rupert, BC	PRR	54°18'N	130°27'W		*			1883	32	10.0	120	12/80-12/82
Bonilla Island, BC	BON	53°30'N	130°38'W		*			1782	16	13.7	125	(12/80-12/82 ordered)
Cape St. James, BC	CSJ	51°56'N	131°01'W		*			1760	89	13.0	115	07/02/80-11/82
McInnes Island, BC	MCI	52°16'N	128°43'W		*			1630	26	9.1	115	12/80-12/82
Rose Point, BC	RSP	Station Info Requested										(12/80-12/82 ordered)
Cape Scott, BC	CSC	50°47'N	128°26'W		*			1467	72	13.0	134	12/80-11/82
Nootka Lightstation	NOO	49°36'N	126°37'W		*			1286	17	12.0	134	12/80-02/82
Lennard Island, BC	LEN	49°07'N	125°55'W		*			1215	15	10.0	134	12/80-05/82
Cape Flattery, WA	CPF	48°23'N	124°44'W		*			1104		6.1	120	12/80-11/82
Neah Bay, WA	NBA	48°22'N	124°36'W		*			1101	15	6.1	120	12/80-11/82
Quillayute, WA	QUI	47°57'N	124°32'W	*	*			1055	56	6.7	110	01/73-09/73; 12/80-09/83
Destruction Island, WA	DST	47°40'N	124°29'W		*			1022	21	6.1	110	12/80-11/82
Hoquiam, WA	HOQ	46°58'N	123°56'W	*	*			942	8	6.1	95	6/73-09/73; 12/80-09/83
Grays Harbor, WA	GRH	46°55'N	124°06'W		*			936	5	6.1	95	12/80-11/82
Cape Disappointment, WA	CPD	46°17'N	124°03'W		*			865	55	6.1	90	12/80-11/82
Columbia River LNB	CLB	46°11'N	124°11'W	*	*	*	*	854	0	10.0	90	12/80-06/84
Astoria, OR	AST	46°09'N	123°53'W	*	*			850	3	6.1	90	01/73-12/75; 12/80-09/83
Newport, OR	NEW	44°38'N	124°03'W		*			683	3	6.1	82	01/73-12/75; 04/80-11/82
Siuslaw River, OR	SIU	44°00'N	124°07'W		*			612	15	6.1	81	12/80-11/82
North Bend, OR	NOB	43°25'N	124°15'W	*	*			547	5	6.1	73	01/73-12/75; 12/80-09/83
Cape Blanco Tower, OR	CBT	42°50'N	124°32'W		*			480		9.1	90	12/80-12/15/83
Cape Blanco Tower, OR	CBT	42°50'N	124°32'W					480		45.7	90	12/80-12/15/83
Cape Blanco, OR	CBL	42°50'N	124°34'W					480	55	10.0	90	04/80-03/02/84
Point St. George, CA	PSG	41°47'N	124°16'W		*			362		12.5	103	12/81-02/04/84
Crescent City, CA	CCY	41°47'N	124°14'W	*	*			362	17	6.1	103	06/73-09/73; 12/80-09/83
Arcata, CA	ACA	40°59'N	124°06'W	*	*			270	70	6.1	75	01/73-12/75; 12/80-09/83
Humboldt Bay, CA	HUM	40°46'N	124°14'W		*			246	3	6.1	75	06/73-09/73; 12/80-11/82
NDBO 46022	B22	40°46'N	124°31'W	*	*	*	*	240	0	5.0	75	01/15/82-06/84
Point Cabrillo, CA	PCB	39°22'N	123°49'W		*			87		6.1	90	12/80-11/82
NDBO 46014	B14	39°13'N	123°58'W	*	*	*	*	71	0	10.0	100	04/81-06/84
Point Arena Light, CA	ARL	38°57'N	123°44'W		*			41	19	6.1	110	12/80-11/82

TABLE 1: Meteorological Station Information (Continued)

Station	Abbreviation	Latitude (Deg Min)	Longitude (Deg Min)	Data Processed Pr/Wind/AT/ST				Alongshore Position (km)	Elevation (m)	Anemometer Height (m)	Coast Orientation (Deg)	Period of Record
N3	N3	38°48'N	123°42'W		*	*	*	19	0	3.5	133	04/08/82-08/17/82
Sea Ranch, CA (Cent. Line)	SRA	38°41'N	123°26'W		*			0	3	10.0	133	03/10/81-08/16/82
C2	C2	38°38'N	123°25'W		*	*	*	0	0	3.5	133	03/23/82-08/17/82
C3	C3	38°36'N	123°28'W		*	*	*	0	0	3.5	133	04/12/81-07/28/82
C4	C4	38°33'N	123°32'W		*	*	*	0	0	3.5	133	04/01/82-08/17/82
C5	C5	38°31'N	123°40'W	*	*	*	*	0	0	3.5	133	04/12/81-08/19/82
R3	R3	38°22'N	123°13'W		*	*	*	-35	0	3.5	133	04/13/81-08/17/82
Bodega Marine Lab, CA	BML	38°19'N	123°04'W		*			-46		10.0	133	01/16/80-09/24/82
NDBO 46013	B13	38°14'N	123°18'W	*	*	*	*	-61	0	10.0	133	04/81-06/84
Pillar Point, CA	PIL	37°30'N	122°30'W		*			-156	40	15.2	105	06/73-09/73; 04/81-11/82
NDBO 46012	B12	37°22'N	122°39'W	*	*	*	*	-171	0	5.0	105	12/80-06/84
Pigeon Point, CA	PIG	37°11'N	122°24'W		*			-191	9	6.1	102	12/80-11/82
Point Pinos, CA	PIN	36°38'N	121°56'W		*			-271	6	6.1	110	12/80-11/82
Monterey, CA	MRY	36°35'N	121°51'W	*	*			-278	50	6.1	110	06/73-09/73; 12/80-09/83
Point Sur, CA	SUR	36°18'N	121°53'W		*			-301	15	6.1	115	12/80-11/82
Point Piedras Blancas, CA	PPB	35°40'N	121°17'W		*			-401	18	6.1	130	11/81-11/82
Morro Bay, CA	MOR	35°22'N	120°48'W		*			-455	18	4.0	130	04/81-11/82
Diablo Canyon, CA	DIA	35°14'N	120°50'W		*			-464	2	9.1	120	05/73-12/75; 04/80-03/83
Diablo Canyon, CA	DIA	35°14'N	120°50'W		*			-464	2	76.2	120	05/73-12/75; 04/80-03/83
Grover City, CA	GRO	35°08'N	120°38'W		*			-487	5	10.6	90	05/82-11/82
NDBO 46011	B11	34°53'N	120°52'W	*	*	*	*	-506	0	10.0	90	12/80-06/84
NDBO 46023	B23	34°15'N	120°40'W	*	*	*	*	-563	0	5.0	90	04/07/82-06/84
Santa Barbara, CA	SBA	34°26'N	119°50'W	*	*			-623	4	6.1	175	06/73-09/73; 12/80-09/83
NDBO 46025	B25	33°36'N	119°00'W	*	*	*	*	-650	0	5.0	170	04/21-06/84
Point Mugu, CA	MUG	34°07'N	119°07'W	*	*			-678	3	4.0	155	01/73-12/75; 12/80-09/83
San Nicholas Island, CA	SNI	33°15'N	119°27'W	*	*			-685	173	3.0	155	01/73-12/75; 12/80-09/83
NDBO 46024	B24	32°50'N	119°10'W	*	*	*	*	-750	0	10.0	155	04/14/82-06/84
Los Angeles, CA	LOS	33°56'N	118°24'W	*	*			-757	34	9.1	150	01/73-12/75; 12/80-09/83
Long Beach, CA	LBC	33°49'N	118°09'W	*	*			-785	21	6.1	150	01/73-12/75; 12/80-09/83
San Clemente Island, CA	SCI	33°01'N	118°35'W	*	*			-825	52	7.9	130	01/73-12/75; 12/80-09/83
San Diego, CA	SDO	32°44'N	117°10'W	*	*			-936	10	6.1	105	01/73-12/75; 12/80-09/83
Imperial Beach, CA	IMP	32°34'N	117°07'W	*	*	*	*	-954	6	6.1	105	01/73-12/75; 12/80-09/83

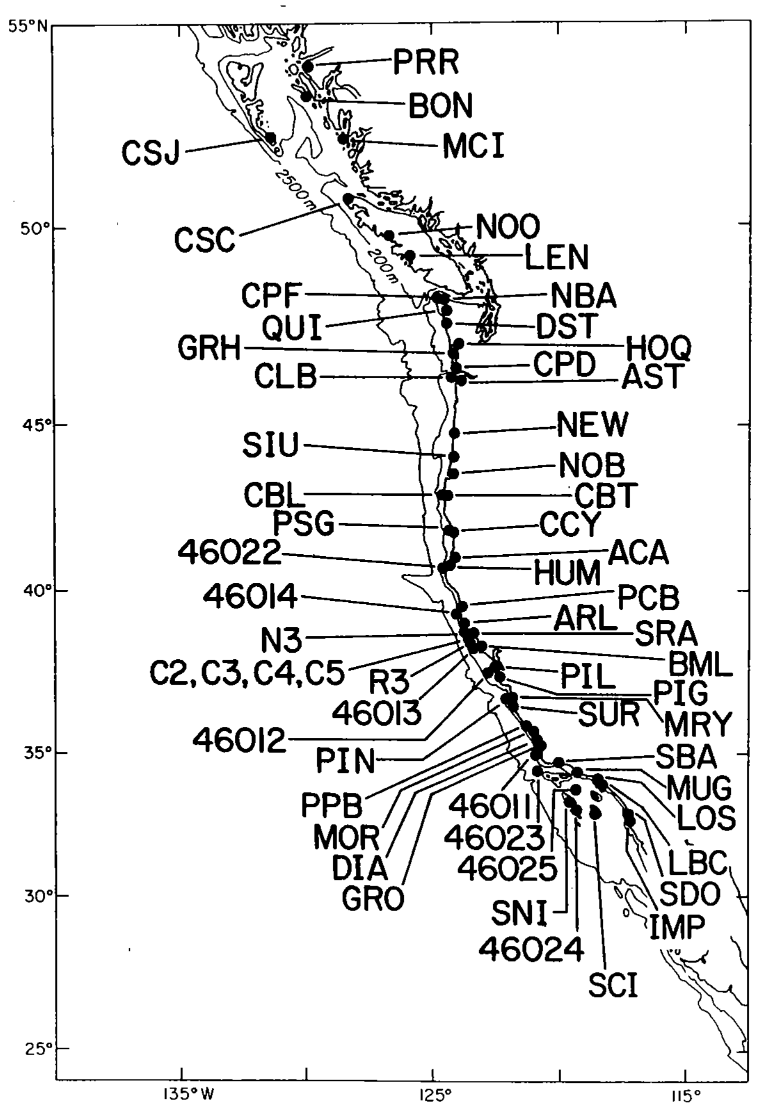

Figure 1: Code-2 meteorological stations.

TABLE 2: CODE Grid for Analyzed Meteorological Fields and Interpolated Sea Level Data

Grid Point	Latitude (Deg Min)	Longitude (Deg Min)	Alongshore Position (km)	Coast Orientation (Deg)
1	31°27'N	116°44'W	-1080	110
2	33°00'N	117°21'W	-900	110
3	34°01'N	118°53'W	-720	150
4	34°35'N	120°39'W	-540	90
5	35°39'N	121°31'W	-360	128
6	37°18'N	122°24'W	-180	102
7	38°42'N	123°27'W	0	133
8	40°12'N	124°18'W	180	130
9	41°46'N	124°12'W	360	103
10	43°21'N	124°20'W	540	73
11	44°58'N	124°03'W	720	85
12	46°36'N	124°05'W	900	95
13	48°11'N	124°42'W	1080	120
14	49°23'N	126°06'W	1260	128
15	50°32'N	127°13'W	1440	100
16	52°10'N	128°19'W	1620	115
17	53°39'N	130°20'W	1800	120
18	30°46'N	118°21'W	--	--
19	32°19'N	119°08'W	--	--
20	32°56'N	121°03'W	--	--
21	33°40'N	122°22'W	--	--
22	35°10'N	123°21'W	--	--
23	36°38'N	124°16'W	--	--
24	38°05'N	125°23'W	--	--
25	39°52'N	126°17'W	--	--
26	41°46'N	126°29'W	--	--
27	43°21'N	126°36'W	--	--
28	44°58'N	126°22'W	--	--
29	46°36'N	126°24'W	--	--
30	48°07'N	127°00'W	--	--
31	26°07'N	112°40'W	-1800	130
32	27°20'N	113°52'W	-1620	130
33	28°47'N	114°41'W	-1441	130
34	30°00'N	115°54'W	-1260	115

9. The time zone is adjusted to GMT where necessary. The unfiltered data selected for this report start at 1200 Z, 26 February and end at 1100 Z, 3 September 1982 for hourly data and 0600 Z, 3 September 1982 for six-hourly data. These times were selected so that filtered data would span the period 1 March through 31 August.

10. All time series are filtered (40 hr low-passed) and converted to a common sampling rate of $\Delta t = 6$ hr. Data with sampling rates of 12 hr are linearly interpolated to $\Delta t = 6$ hr before filtering.

11. Time series are plotted and checked.

12. Sea levels are barometrically adjusted by adding atmospheric pressure (Table 4).

C. WIND DATA

C.1 Statistical Summary of Measured Winds

Measured wind statistics for all available stations between 1200 Z, 26 February and 1100 Z, 3 September 1982 computed using unfiltered data are summarized in Table 5. In addition to the basic statistics of the u and v components, principal axes and coastline orientations, plus standard deviations of the principal axes wind components are included. A summary of data gaps is also presented. The same information is presented for calculated Bakun winds between 1200 Z, 26 February and 0600 Z, 3 September 1982 in Table 6.

C.2 Plots of Measured and Bakun Winds

Three sets of 40-hr low-passed wind plots are presented. Data are filtered with a symmetric Cosine-Lanczos filter, Pittock et al. (1982). First, vector plots of measured winds at 40 selected stations are presented in Figure 5. Second, major and minor axis plots of measured winds at the same stations are presented in Figure 6. (Refer to Table 6 for principal axes orientations.) Third, vector plots of Bakun winds at selected coastal grid points are presented in Figure 7 for comparison to the measured winds. Some of the measured wind stations are not plotted if data from other relatively good quality nearby stations are plotted. For Bakun winds, every other coastal grid point is adequate to plot due to high coherence at separation scales less than a few hundred kilometers. Note that the low-pass filter requires 2.5 days to be discarded at each end, which increases the length of each internal data gap documented in Table 5 by five days.

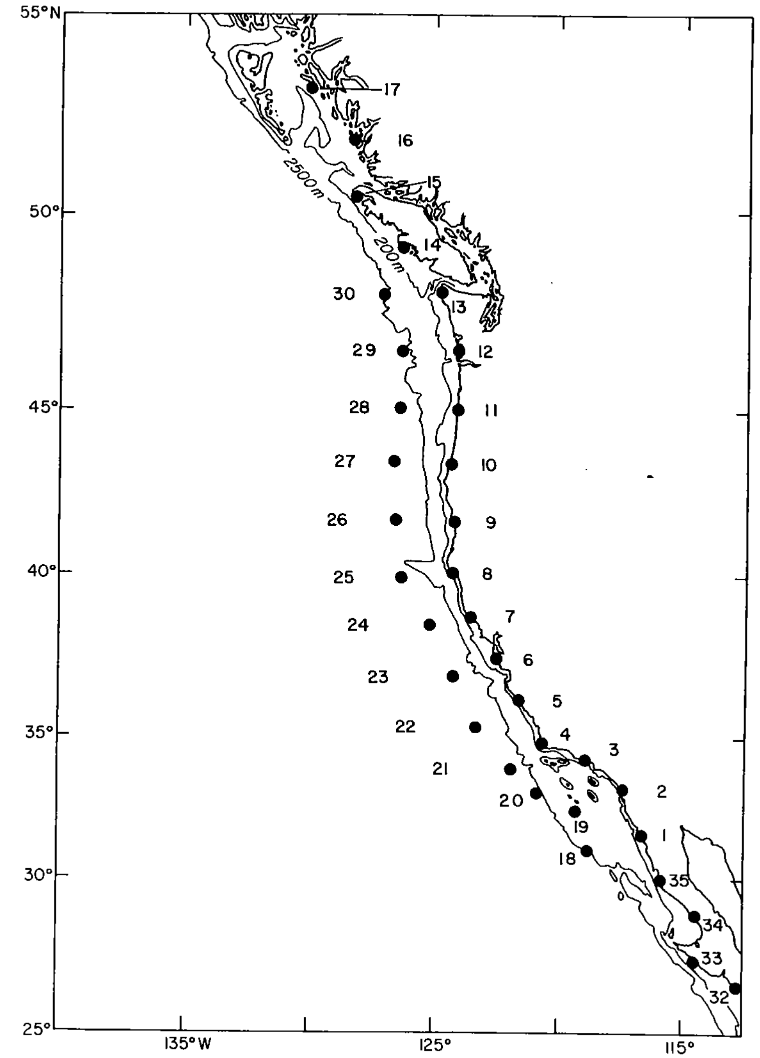

Figure 2: The CODE analysis grid.

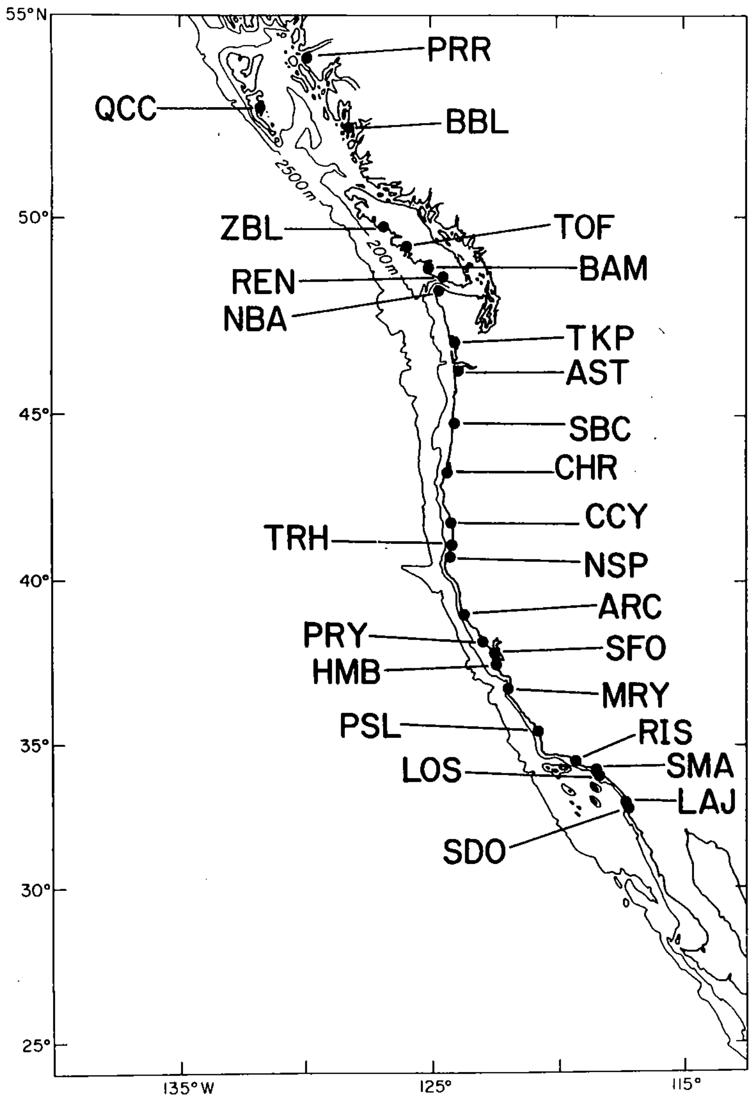

Figure 3: CODE-2 sea level stations.

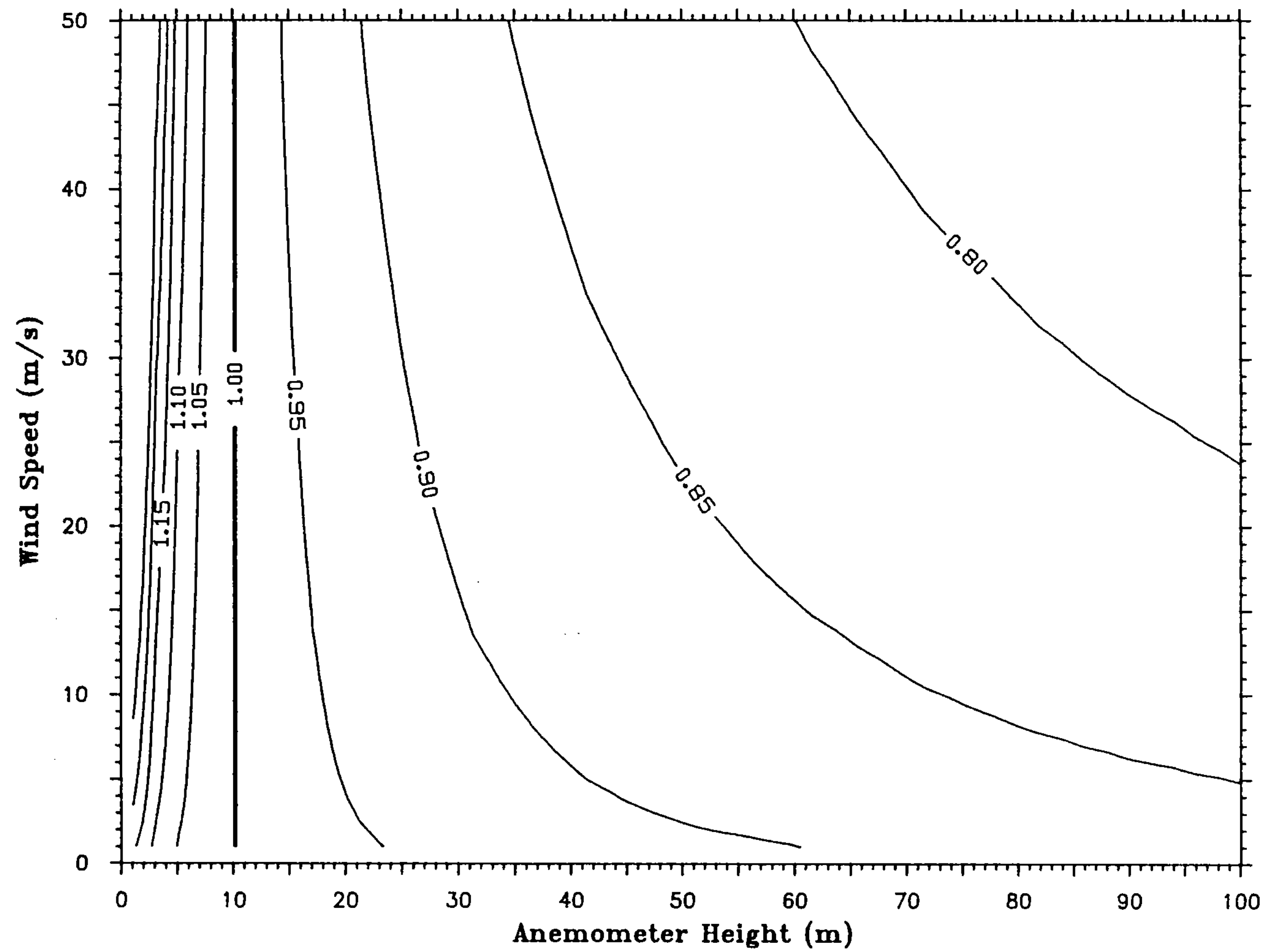

Figure 4: The correction factor for wind speed adjustment to 10 m as a function of anemometer height and wind speed.

TABLE 3: Sea Level Measurement Station Information

Station	Abbreviation	Lat. (° Min)	Long. (° Min)	Alongshore Position (km)	Period of Record	Atmospheric Pressure Stations Used for Barometric Adjustment (Interpolated = 2 Stations)
Prince Rupert, BC	PRR	54°19'N	130°20'W	1883	01/73-12/75; 04/80-Present	CG17
Queen Charlotte City, BC	QCC	53°17'N	132°02'W	1800	01/73-12/75; 04/80-Present	CG16
Bella Bella, BC	BBL	52°10'N	128°08'W	1608	01/73-12/75; 04/80-Present	CG16
Zeballos, BC	ZBL	50°01'N	126°47'W	1349	04/80-Present	CG14-CG15
Tofino, BC	TOF	49°09'N	125°55'W	1232	01/73-12/75; 04/80-Present	CG14
Bamfield, BC	BAM	48°49'N	125°06'W	1164	04/80-Present	CG13-CG14
Port Renfrew, BC	REN	48°33'N	124°24'W	1110	04/80-Present	CG13
Neah Bay, WA	NBA	48°22'N	124°37'W	1100	01/73-12/75; 04/80-Present	CG13
Toke Point, WA	TKP	46°42'N	123°58'W	911	08/73-09/75; 04/80-Present	CG12
Astoria, OR	AST	46°10'N	123°46'W	852	01/73-12/75; 04/80-Present	CG11-CG12
South Beach, OR	SBC	44°38'N	124°03'W	683	01/73-12/75; 01/80-Present	CG10-CG11
Charleston, OR	CHR	43°20'N	124°19'W	538	01/73-12/75; 04/80-Present	CG10
Crescent City, CA	CCY	41°45'N	124°11'W	359	01/73-12/75; 04/80-Present	CG09
Trinidad Head, CA	TRH	41°03'N	124°09'W	277	04/80-Present	CG08-CG09
North Spit, CA	NSP	40°45'N	124°14'W	244	04/80-Present	CG08-CG09
Arena Cove, CA	ARC	38°55'N	123°43'W	37	04/80-Present	CG07-CG08
Point Reyes, CA	PRY	38°00'N	122°58'W	-76	04/80-Present	CG06-CG07
San Francisco, CA	SFO	37°48'N	122°28'W	-126	01/73-12/75; 04/80-Present	CG06-CG07
Half Moon Bay, CA	HMB	37°30'N	122°29'W	-163	08/19/81-Present	CG06
Monterey, CA	MRY	36°36'N	121°53'W	-276	01/73-12/75; 04/80-Present	CG05-CG06
Port San Luis, CA	PSL	35°10'N	120°45'W	-473	01/73-12/75; 04/80-Present	CG04-CG05
Rincon Island, CA	RIS	34°21'N	119°27'W	-650	01/73-12/74; 04/80-Present	CG04-CG05
Santa Monica, CA	SMA	34°01'N	118°27'W	-739	04/80-Present	CG03
Los Angeles, CA	LOS	33°43'N	118°16'W	-780	01/73-12/75; 04/80-Present	CG02-CG03
La Jolla, CA	LAJ	32°55'N	117°51'W	-920	04/80-Present	CG02
San Diego, CA	SDO	32°45'N	117°10'W	-938	01/73-12/75; 04/80-Present	CG01-CG02

TABLE 4: Meteorological Data Source Information

Source	Stations	Sampling Times and Time Zone	Source Format	Source Units: Pressure	Source Units: Winds	Other Variables Received
1. University of Wisconsin SSEC McIdas surface obs.	QUI HOQ AST NOB CCY ACA MRY SBA MUG SNI LOS LBC SCI SDO IMP	Δt=1 hr[1] GMT Δt=1 hr[1] Δt=1 hr[1] Δt=1 hr[1] [16]Δt=1 hr[1] [2] Δt=1 hr[1] Δt=1 hr[1] Δt=1 hr[1] Δt=1 hr[1] [16]Δt=1 hr[1] [3] Δt=1 hr[1] Δt=1 hr[1] Δt=1 hr[1] Δt=1 hr[1] [16]Δt=1 hr[1] [4]	magnetic tape	altimeter setting	speed - knots direction-degrees clockwise from N	air temperature relative humidity precipitation visibility
2. NDBO buoy data (sent by NCC)	CLB B11 B12 B13 B14 B22 B23 B24 B25	Δt=1 hr[1] [5] GMT Δt=1 hr[1] Δt=1 hr[1] Δt=1 hr[1] Δt=1 hr[1] Δt=1 hr[1] Δt=1 hr[1] Δt=1 hr[1] Δt=1 hr[1]	magnetic tape in NDBO format containing data from all buoys worldwide	mb	speed - m/s direction-degrees clockwise from N	air temperature dew point, weather visibility, sea surface temperature wave statistics
3. OSU Atmospheric Science Dept.	CBL CBT[6]	Δt=1 hr[1] [5] PST Δt=1 hr[1] [5]	disk file	(none)	speed - knots direction-degrees clockwise from N	(none)
4. Marine circuit reports north region (NWS SOSU, Seattle)	CPF NBA DST GRH CPD SIU	Δt=3 hr[1] [5] GMT [6]Δt=3 hr[1] [3] [5] Δt=3 hr[1] [5] Δt=3 hr[1] [5] [5]Δt=3 hr[1] [3] [5] [6]Δt=3 hr[1] [3] [5]	teletype output (coded and keypunched)	(none)	speed - knots direction - 16 pt.[7]	wave height[8] air temperature

TABLE 4: Meteorological Data Source Information (Continued)

Source	Stations	Sampling Times and Time Zone	Source Format	Source Units: Pressure	Source Units: Winds	Other Variables Received
5. Marine circuit reports - south region (NWS WSFO Redwood City)	ARL PIG SUR PPB	Δt=1 hr(1) (5) GMT Δt=1 hr(1) (5) Δt=1 hr(1) (5)	teletype output (coded and keypunched)	(none)	speed - knots direction - 16 pt.(7)	(none)
6. Meteorological data logs from NCC	 HJM PCB PIL PIN	[5]Δt=3 hr(1) (3) (5) PST Δt=3 hr 07,10,13,16,19 (1) Δt=3 hr(5) (9) Δt=3 hr	marine coastal weather log (coded and keypunched)	(not digitized)	speed - knots direction - 16 pt.(7)	sky condition visibility sea state air temperature
7. Batelle NW Labs wind tower data.	CBT(10)	Δt=1 hr(1) (5) PST Δt=1 hr(1) (5)	magnetic tape	(none)	speed - m/s direction-degrees clockwise from N	(none)
8. OSU Oceanography	NEW PSG	Δt=1 hr GMT	magnetic tape	mb	u,v - m/s	(none)
9. Pacific Gas and Electric	DIA	Δt=1 hr(1) (5) PST	magnetic tape	(none)	speed - mph direction-degrees clockwise from N	dew point air temperature
10. Scripps Institution of Oceanography	BML SRA	Δt=1 hr PST	magnetic tape	(none)	alongshore and across-shore	(none)
11. WHOI CODE buoys	N3 C2 C3 C4 C5 R3	Δt=1 hr GMT	magnetic tape	mb (C5 only)	speed - m/s direction-degrees clockwise from N	air temperature sea surface temperature insolation

TABLE 4: Meteorological Data Source Information (Continued)

Source	Stations	Sampling Times and Time Zone	Source Format	Source Units: Pressure	Source Units: Winds	Other Variables Received
12. Canada Climate Centre	PRR BON MCI RSP CSC NOO LEN CST(11)	Δt=1 hr GMT	magnetic tape	(none)	speed - m/s direction-degrees clockwise from N(12)	(none)
13. University of British Columbia	CSJ(13)	Δt=1 hr GMT				(none)
14. San Luis Obispo Air Pollution Control District	MOR GRO	Δt=1 hr PST	hardcopy data forms (coded and keypunched)	(none)	speed - m/s direction-degrees clockwise from N	(none)
15. FNOC/Compass Systems, Inc. Bakun Data	35-pt. CODE Grid	Δt=6 hr GMT	card-image magnetic tape	mb	u(m/s) v(m/s)	wind stress divergence wind stress curl Ekman transport Sverdrup Transport

Notes:

(1) Occasional (< 20 percent) missing data observations. For the SSEC University of Wisconsin data set, most missing reports were due to down time of the McIDAS computers at Wisconsin used for real-time data collection.

(2) After mid-July 1981, station did not record data at night. The number of observations per day is given in brackets.

(3) The station did not record data at night. The number of observations per day is given in brackets.

(4) The station did not record data at night or on weekends. The number of observations per day during the week is given in brackets.

(5) Long data gaps (> 1 day) occurred occasionally.

TABLE 4: Meteorological Data Source Information (Continued)

(6) After 11/1/81.
(7) N, NNE, NE, etc.
(8) Not at all stations.
(9) Frequent (> 20 percent) missing data observations.
(10) Prior to 11/1/81.
(11) After 9/1/82.
(12) 36-point compass for PRR, MCI, CSC, CSJ; 8-point compass for BON, RSP, NOO, LEN.
(13) Prior to 9/1/82.

Important Abbreviations

FNOC = Fleet Numerical Oceanography Center
NCC = National Climatic Center
NDBO = National Data Buoy Office
NWS = National Weather Service
OSU = Oregon State University
SOSU = Seattle Ocean Services Unit
SSEC = Space Science and Engineering Center, University of Wisconsin
WSFO = Weather Service Forecast Office

TABLE 5: Statistical Summary of Measured Winds

Station	Alongshore Position (km)	Coast[4] Orientation	Data Gap Summary: Number	Data Gap Summary: Start Time	Data Gap Summary: End Time	Percent Good Data	Principal[4] Axes Major	Principal[4] Axes Minor	Principal Axes Std Dev (m/s) Major	Principal Axes Std Dev (m/s) Minor	Wind Components	u,v Basic Statistics (m/s) Mean	Std Dev	Max	Min
PRR	1883	120		(None)		100	140	50	3.29	1.83	u	0.07	2.78	8.33	-11.06
											v	1.00	2.54	12.51	-7.46
BON	1782	125		(Data Ordered)							u				
											v				
CSJ	1760	115		(None)		100	117	27	6.80	3.80	u	2.68	4.57	18.13	-20.72
											v	-1.50	6.31	19.68	-16.23
MCI[1]	1630	115		(24 Short Gaps)		91	111	21	5.15	2.84	u	0.70	3.24	12.05	-10.94
											v	0.57	4.91	18.26	-12.67
RSP[2]				(Data Ordered)							u				
											v				
CSC	1467	134		(None)		100	101	11	3.09	1.32	u	-0.03	1.42	7.06	-7.15
											v	0.59	3.05	12.80	-9.43
NOO	1286	134		(Data Ordered)							u				
											v				
LEN[3]	1215	134	1	03/01/0200	03/01/1500	33	37	-53	4.68	4.13	u	-1.93	4.49	10.00	-4.85
			2	04/01/0000	04/30/2300						v	0.91	4.34	10.00	-9.40
			3	05/07/0700	05/07/2100										
			4	05/24/1800	05/26/0000										
			5	06/01/0000	09/03/1100										
CPF	1104	120	1	02/26/1200	06/20/2300	39	48	-42	2.55	2.07	u	0.80	2.30	10.25	-8.07
											v	2.05	2.35	-4.92	-6.84
NBA	1101	120	1	06/13/2200	06/20/2300	96	176	86	3.04	1.80	u	1.55	3.04	9.96	-12.48
											v	0.26	1.81	13.52	-6.44
QUI	1055	110		(None)		100	130	40	2.15	1.78	u	0.72	1.94	8.94	-5.32
											v	0.31	2.01	7.88	-5.85
DST	1022	110	1	02/26/1200	06/20/2300	39	138	48	3.31	1.34	u	1.22	2.63	9.45	-5.90
											v	-0.73	2.42	9.16	-7.22
HOQ	942	95	1	05/01/0000	05/02/1200	99	150	60	3.68	2.38	u	1.85	3.40	13.52	-11.67
											v	-0.44	2.76	13.73	-11.70
GRH	936	95	1	08/24/1700	09/03/1100	95	100	10	4.04	2.86	u	1.54	2.91	12.48	-9.96
											v	-0.96	4.01	22.66	-11.47
CPD	865	90	1	06/13/2200	06/20/2300	96	112	22	5.06	2.89	u	1.06	3.28	12.48	-17.56
											v	0.49	4.82	24.57	-9.96

TABLE 5: Statistical Summary of Measured Winds (Continued)

Station	Alongshore Position (km)	Coast[4] Orientation	Data Gap Summary Number	Start Time	End Time	Percent Good Data	Principal[4] Axes Major	Minor	Principal Axes Std Dev (m/s) Major	Minor	Wind	u,v Basic Statistics (m/s) Mean	Std Dev	Max	Min
CLB	854	90	1	03/07/0200	09/03/1100	5	115	25	5.73	4.57	u	-0.24	4.82	11.83	-9.79
			2								v	4.02	5.54	14.17	-7.72
AST	850	90		(None)		100	144	54	3.34	2.58	u	1.53	3.10	10.64	-8.61
											v	0.56	2.86	12.97	-8.09
NEW	683	82		(None)		100	77	-13	3.14	1.72	u	0.14	1.83	6.23	-7.49
											v	-1.00	3.08	10.54	-12.23
SIU	612	81	1	02/26/1200	03/04/1500	93	89	-1	5.47	2.50	u	1.05	2.51	17.27	-9.52
			2	06/13/1900	06/20/2300						v	-1.76	5.47	22.66	-18.47
NOB	547	73		(None)		100	111	21	4.59	2.19	u	1.14	2.64	11.88	-7.52
											v	-1.46	4.35	13.32	-17.92
CBT (9.1 m)	480	90	1	02/26/1200	06/14/0600	43	97	7	5.82	2.03	u	0.22	2.15	8.02	-7.19
											v	-4.01	5.78	13.31	-14.04
CBT (45.7 m)	480	90	1	02/26/1200	06/14/0600	43	99	9	5.44	1.66	u	0.40	1.86	5.63	-4.97
											v	-3.89	5.38	12.39	-12.80
CBL	480	90	1	03/30/1600	03/31/1500	73	63	-27	9.84	4.55	u	-1.65	6.01	39.52	-13.23
			2	04/03/2300	04/06/1800						v	-3.21	9.02	35.46	-20.79
			3	04/12/0400	04/19/1800										
			4	06/08/1500	06/12/0300										
			5	06/12/1400	06/19/1200										
			6	06/20/0500	06/29/1900										
			7	07/01/0000	07/04/0100										
			8	07/04/0300	07/09/0600										
			9	07/09/0800	07/13/1600										
			10	07/18/0300	07/21/1500										
			11	08/31/0400	09/03/1100										
PSG	362	103	1	05/18/0600	06/03/1800	91	107	17	5.17	2.09	u	-0.35	2.50	12.26	-13.25
											v	-0.13	4.98	15.58	-17.49
CCY	362	103	1	05/01/1000	05/02/1500	99	107	17	5.00	2.38	u	1.24	2.72	11.45	-21.41
											v	-0.63	4.82	15.16	-16.45
ACA	270	75		(None)		100	122	32	3.55	1.93	u	1.01	2.48	9.33	-9.33
											v	-0.60	3.19	11.16	-10.74
HJM	246	75	1	02/28/0300	03/01/0700	99	98	8	4.02	2.00	u	0.37	2.07	9.96	-13.39
			2	08/13/0700	08/14/1700						v	-0.97	3.99	15.01	-11.88

TABLE 5: Statistical Summary of Measured Winds (Continued)

Station	Alongshore Position (km)	Coast[4] Orien-tation	Data Gap Summary Number	Start Time	End Time	Percent Good Data	Principal[4] Axes Major	Minor	Principal Axes Std Dev (m/s) Major	Minor	Wind Compo-nents	u,v Basic Statistics (m/s) Mean	Std Dev	Max	Min
B22	240	75		(None)		100	86	-4	5.90	2.02	u	0.41	2.05	12.46	-10.23
											v	-2.20	5.89	18.72	-16.67
PCB	87	90	1	06/08/2000	06/12/0000	94	125	35	3.52	1.48	u	1.04	2.35	11.45	-7.45
			2	08/04/0200	08/08/1500						v	-0.89	3.02	15.01	-11.45
			3	08/14/2000	08/17/1500										
B14	71	100		(None)		100	112	22	6.10	2.15	u	2.53	3.04	12.15	-9.95
											v	-3.34	5.71	18.83	-15.98
ARL	41	110		(None)		100	98	8	5.01	1.81	u	0.27	1.91	12.43	-10.30
											v	-2.43	4.98	18.47	-14.07
N3	19	133		(Corrected Data Requested)							u				
											v				
SRA	0	133	1	08/16/1600	09/03/1100	91	122	32	3.80	1.93	u	1.04	2.58	11.81	-6.96
											v	-1.10	3.40	11.81	-9.66
C2	0	133		(Corrected Data Requested)							u				
											v				
C3	0	133	1	02/26/1200	03/24/1200	67	133	43	6.50	2.01	u	4.49	4.66	15.09	-11.15
			2	07/28/1300	09/03/1100						v	-3.39	4.96	13.32	-13.03
C4	0	133		(Corrected Data Requested)							u				
											v				
C5	0	133	1	02/26/1200	03/30/1200	75	109	19	6.42	1.87	u	3.27	2.73	9.23	-9.88
			2	08/19/1300	09/03/1100						v	-6.69	6.11	14.91	-18.27
R3	-35	133	1	02/26/1200	03/23/1200	78	135	45	6.17	1.94	u	4.58	4.60	14.74	-10.36
			2	08/17/1300	09/03/1100						v	-3.38	4.55	13.85	-12.81
BML	-46	133		(None)		100	136	46	4.02	2.42	u	2.80	3.34	14.53	-7.54
											v	-0.85	3.29	14.93	-9.24
B13	-61	133		(None)		100	132	42	5.74	2.10	u	4.34	4.13	15.54	-10.90
											v	-3.11	4.51	14.52	-11.44
PIL	-156	105		08/31/2300	09/02/2100	99	139	49	4.55	2.03	u	2.62	3.68	16.84	-13.96
											v	-0.43	3.36	17.24	-12.58
B12	-171	105		02/26/1200	04/23/1600	70	111	21	3.96	1.17	u	2.54	1.78	10.80	-2.69
											v	-3.25	3.73	9.56	-13.94
PIG	-191	102		(None)		100	137	47	5.68	2.66	u	2.37	4.53	14.51	-19.61
											v	-1.69	4.34	17.04	-11.97

TABLE 5: Statistical Summary of Measured Winds (Continued)

Station	Alongshore Position (km)	Coast[4] Orientation	Data Gap Summary: Number	Start Time	End Time	Percent Good Data	Principal[4] Axes Major	Minor	Principal Axes Std Dev (m/s) Major	Minor	Wind Components	u,v Basic Statistics (m/s) Mean	Std Dev	Max	Min
PIN	-271	110	1	05/18/1200	05/19/1600	99	140	50	3.24	2.67	u	3.26	3.02	17.92	-5.95
											v	0.32	2.92	14.07	-11.45
MRY	-278	110	1	04/30/2200	05/20/1200	99	151	61	1.93	1.24	u	1.18	1.79	9.69	-5.33
											v	-0.21	1.44	6.98	-7.41
SUR	-301	115		(None)		100	116	26	5.01	1.56	u	1.43	2.60	9.52	-10.30
											v	-3.42	4.56	16.03	-12.48
PPB	-401	130	1	03/18/1900	03/31/2300	83	141	51	4.75	1.44	u	3.15	3.82	15.53	-13.50
			2	06/13/0700	06/29/2300						v	-2.58	3.18	10.30	-12.23
			3	08/28/2200	08/31/1400										
MOR	-455	130		(None)		100	159	69	2.23	1.23	u	1.00	2.14	7.81	-6.29
											v	-0.21	1.39	5.71	-6.71
DIA (9.1 m)	-464	120	1	07/22/0300	07/23/1800	99	139	49	4.34	1.21	u	2.70	3.73	12.55	-12.26
											v	-2.62	3.33	10.18	-11.87
DIA (76.2 m)	-464	120	1	08/30/1800	09/01/1900	99	134	44	4.32	1.22	u	2.14	3.12	9.49	-10.91
											v	-2.44	3.23	10.01	-10.71
GRO	-487	90	1	02/26/1200	05/01/0700	66	161	71	2.09	1.07	u	1.24	2.01	7.52	-3.47
											v	-0.17	1.21	4.01	-4.24
B11	-506	90	1	02/26/1200	03/10/2200	93	127	37	4.11	1.62	u	3.25	2.80	10.89	-7.10
											v	-3.45	3.43	11.24	-10.67
B23	-563	90	1	02/26/1200	04/06/2300	63	123	33	4.02	1.44	u	4.14	2.49	9.40	-9.90
			2	04/27/0000	05/26/2300						v	-6.71	3.47	6.24	-13.58
SBA	-623	175		(None)		100	181	91	2.74	1.92	u	0.39	2.74	14.40	-9.55
											v	0.91	1.92	7.07	-8.39
B25	-650	170	1	02/26/1200	04/20/1900	72	165	75	2.46	1.09	u	2.50	2.39	11.00	-5.71
											v	0.00	1.24	4.32	-5.37
MUG	-678	155		(None)		100	177	87	2.40	1.59	u	1.39	2.39	11.11	-12.20
											v	-0.11	1.59	9.40	-9.46
SNI	-685	155	1	05/01/0000	05/02/1400	91	133	43	3.45	1.57	u	3.12	2.60	11.06	-8.05
											v	-2.75	2.75	7.56	-10.52
B24	-750	155	1	02/26/1200	04/14/0200	75	135	45	3.56	1.24	u	4.78	2.66	12.71	-5.11
											v	-3.79	2.68	3.64	-11.29

TABLE 5: Statistical Summary of Measured Winds (Continued)

Station	Alongshore Position (km)	Coast Orientation (4)	Data Gap Summary: Number	Start Time	End Time	Percent Good Data	Principal Axes (4): Major	Minor	Principal Axes Std Dev (m/s): Major	Minor	Wind Components	u,v Basic Statistics (m/s): Mean	Std Dev	Max	Min
LOS	-757	150	(None)			100	187	97	2.97	1.37	u	2.45	2.96	11.25	-5.70
											v	0.73	1.41	8.29	-4.94
LBC	-785	150	(None)			100	130	40	2.54	2.08	u	1.09	2.28	9.16	-10.64
											v	1.05	2.37	11.70	-5.62
SCI	-825	130	(None)			100	156	66	2.54	1.52	u	2.49	2.12	9.99	-6.20
											v	0.18	1.66	12.63	-4.65
SDO	-936	105	(None)			100	121	31	3.02	2.21	u	2.31	2.45	9.55	-6.90
											v	-0.48	2.82	13.32	-8.59
IMP (1)	-954	105	(27 Short Gaps)			66	173	83	2.24	1.66	u	1.94	2.23	9.02	-8.07
											v	0.63	1.67	12.17	-4.01

Notes:

(1) This station usually closed on weekends.

(2) Information about this station has been requested from the source agency.

(3) Data for 6/1 through 8/31 has been ordered from the source agency.

(4) Angles are measured in degrees from east; positive is counter-clockwise, negative is clockwise.

Table 6: Bakun Wind Statistics

Grid Points	Alongshore Position (km)	Coast Orientation (Degrees)	Principal Axes Major	Principal Axes Minor	Principal Axes Std Dev (m/s) Major	Principal Axes Std Dev (m/s) Minor	Wind Compo-nents	u,v Basic Statistics (m/s) Mean	Std Dev	Max	Min
CG01	-1080	110	123	33	2.78	1.70	u	4.68	2.08	9.70	-4.51
							v	-7.34	2.51	4.13	-13.08
CG02	-900	110	135	45	3.10	2.02	u	4.73	2.61	11.63	-6.92
							v	-5.82	2.62	6.53	-11.01
CG03	-720	150	129	39	3.25	2.20	u	4.92	2.67	12.94	-6.36
							v	-5.02	2.87	7.29	-10.99
CG04	-540	90	110	20	3.25	2.13	u	4.29	2.29	11.63	-3.65
							v	-4.24	3.14	8.78	-10.23
CG05	-360	128	105	15	3.73	2.17	u	3.63	2.31	10.64	-4.67
							v	-4.64	3.65	12.63	-10.88
CG06	-180	102	92	2	4.40	2.31	u	2.69	2.32	9.70	-5.12
							v	-5.01	4.40	15.66	-12.55
CG07	0	133	80	-10	5.15	2.42	u	1.61	2.54	11.01	-5.24
							v	-4.96	5.10	17.10	-16.04
CG08	180	130	71	-19	5.59	2.67	u	0.74	3.12	13.20	-9.19
							v	-4.63	5.36	17.82	-16.61
CG09	360	130	61	-29	5.23	2.97	u	0.15	3.65	13.55	-12.22
							v	-3.91	4.79	17.15	-14.77
CG10	540	73	63	-27	4.97	2.85	u	0.50	3.41	11.68	-11.65
							v	-3.20	4.61	16.54	-14.86
CG11	720	85	76	-14	4.41	2.80	u	1.29	2.92	9.33	-10.96
							v	-3.06	4.34	15.86	-15.89
CG12	900	95	98	8	4.11	2.70	u	1.63	2.73	9.70	-9.20
							v	-2.88	4.09	15.97	-15.54
CG13	1080	120	109	19	4.11	2.73	u	1.79	2.91	10.00	-7.94
							v	-2.36	3.98	16.75	-14.09
CG14	1260	128	111	21	4.20	2.85	u	1.87	3.06	10.00	-11.01
							v	-1.63	4.05	16.80	-12.04
CG15	1440	100	104	14	4.82	3.03	u	1.80	3.17	9.08	-14.32
							v	-0.68	4.73	16.21	-11.75
CG16	1620	115	126	36	4.68	3.49	u	1.92	3.93	9.84	-18.80
							v	-0.65	4.32	13.89	-10.26
CG17	1800	120	128	38	5.37	3.40	u	1.44	4.26	9.26	-24.95
							v	-0.09	4.72	14.33	-8.33

Table 6: Bakun Wind Statistics (Continued)

Grid Points	Alongshore Position (km)	Coast Orientation (Degrees)	Principal Axes		Principal Axes Std Dev (m/s)		Wind Compo-nents	u,v Basic Statistics (m/s)			
			Major	Minor	Major	Minor		Mean	Std Dev	Max	Min
CG18	-	-	106	16	2.73	1.41	u	3.87	1.55	8.64	-2.29
							v	-6.46	2.65	5.47	-12.25
CG19	-	-	112	22	2.89	1.63	u	4.55	1.87	9.46	-3.03
							v	-5.22	2.75	6.99	-10.29
CG20	-	-	101	11	3.11	1.64	u	3.79	1.73	8.83	-2.25
							v	-3.79	3.07	7.40	-9.77
CG21	-	-	99	9	3.55	1.65	u	3.21	1.72	8.28	-3.98
							v	-3.59	3.52	11.61	-9.98
CG22	-	-	98	8	4.08	1.83	u	3.07	1.90	8.41	-4.47
							v	-4.09	4.05	14.72	-10.52
CG23	-	-	91	1	4.98	1.99	u	2.56	2.00	8.78	-4.98
							v	-4.55	4.98	17.93	-12.94
CG24	-	-	85	-5	5.93	2.18	u	1.82	2.25	10.94	-5.85
							u	-4.65	5.91	18.94	-16.34
CG25	-	-	78	-12	6.37	2.43	u	1.24	2.71	13.49	-8.09
							v	-4.31	6.26	19.77	-16.49
CG26	-	-	71	-19	5.87	2.56	u	0.73	3.10	13.57	-8.76
							v	-3.33	5.61	18.73	-16.59
CG27	-	-	70	-20	5.20	2.62	u	0.85	3.04	11.72	-8.35
							v	-2.46	4.97	17.82	-15.56
CG28	-	-	76	-14	4.60	2.55	u	1.20	2.73	9.57	-8.14
							v	-2.02	4.50	17.28	-14.32
CG29	-	-	87	-3	4.25	2.46	u	1.49	2.46	8.55	-7.23
							v	-1.89	4.29	17.41	-13.54
CG30	-	-	99	9	4.45	2.45	u	1.57	2.52	8.81	-8.58
							v	-1.53	4.42	18.09	-12.26
CG32	-1800	130	112	22	1.91	1.79	u	3.93	1.81	9.49	-1.79
							v	-3.28	1.90	1.28	-10.74
CG33	-1620	130	196	106	2.02	1.79	u	5.23	2.00	10.79	-2.08
							v	-3.14	1.81	1.91	-9.26
CG34	-1440	130	162	72	2.10	1.74	u	5.36	2.07	10.06	-2.77
							v	-5.07	1.77	1.94	-9.25
CG35	-1260	115	126	36	2.49	1.66	u	5.03	1.99	9.24	-3.62
							v	-7.60	2.24	2.78	-13.68

TABLE 7: Measured Adjusted Coastal Sea Level (cm)

Station	Along-Shore Position (km)	Data Gap Summary Number	Start Time	End Time	Percent Good Data	Mean(1)	Std Dev	Max	Min
PRR	1883		(None)		100	0	5.47	15.29	-12.86
QCC	1800		(None)		100	0	5.70	20.77	-13.81
BBL	1608		(None)		100	0	5.87	19.88	-16.31
ZBL	1349		(None)		100	0	9.83	32.06	-30.59
TOF	1232		(None)		100	0	9.43	33.85	-24.56
BAM	1164		(None)		100	0	8.88	30.02	-18.06
REN	1110		(None)		100	0	8.81	29.02	-16.00
NBA	1100		(None)		100	0	11.30	37.09	-18.63
TKP	911		(None)		100	0	16.35	63.20	-27.74
AST	852		(None)		100	0	12.06	34.22	-19.63
SBC	683		(None)		100	0	11.59	36.60	-23.98
CHR	538		(None)		100	0	10.01	28.71	-19.74
CCY	359		(None)		100	0	8.72	28.10	-19.21
TRH	277	1	03/01/0000	04/29/1200	68	0	6.73	12.87	-15.72
NSP	244		(None)		100	0	7.51	19.07	-19.19
ARC	37		(None)		100	0	6.49	15.78	-15.64
PRY	-76		(None)		100	0	6.49	18.65	-17.80
SFO	-126		(None)		100	0	4.80	16.25	-10.14
HMB	-163		(None)		100	0	4.90	12.58	-12.32
MRY	-276		(None)		100	0	4.10	10.62	-9.19
PSL	-473		(None)		100	0	4.40	11.11	-11.52
RIS	-650		(None)		100	0	5.29	12.71	-11.21
SMA	-739		(None)		100	0	5.97	13.21	-11.83
LOS	-780		(None)		100	0	6.30	19.48	-13.30
LAJ	-920		(None)		100	0	5.98	16.15	-12.47
SDO	-938		(None)		100	0	6.14	15.82	-14.10

Note:

(1) Sea level time series were demeaned.

D. COASTAL SEA LEVEL DATA

D.1 Statistical Summary of Adjusted Coastal Sea Level

Adjusted coastal sea level statistics for all available measurement stations are summarized in Table 7.

D.2 Plots of Adjusted Coastal Sea Level

Plots of 40-hr low-passed adjusted sea level time series are presented for all stations except Toke Point, the only station with a gap, in Figure 8.

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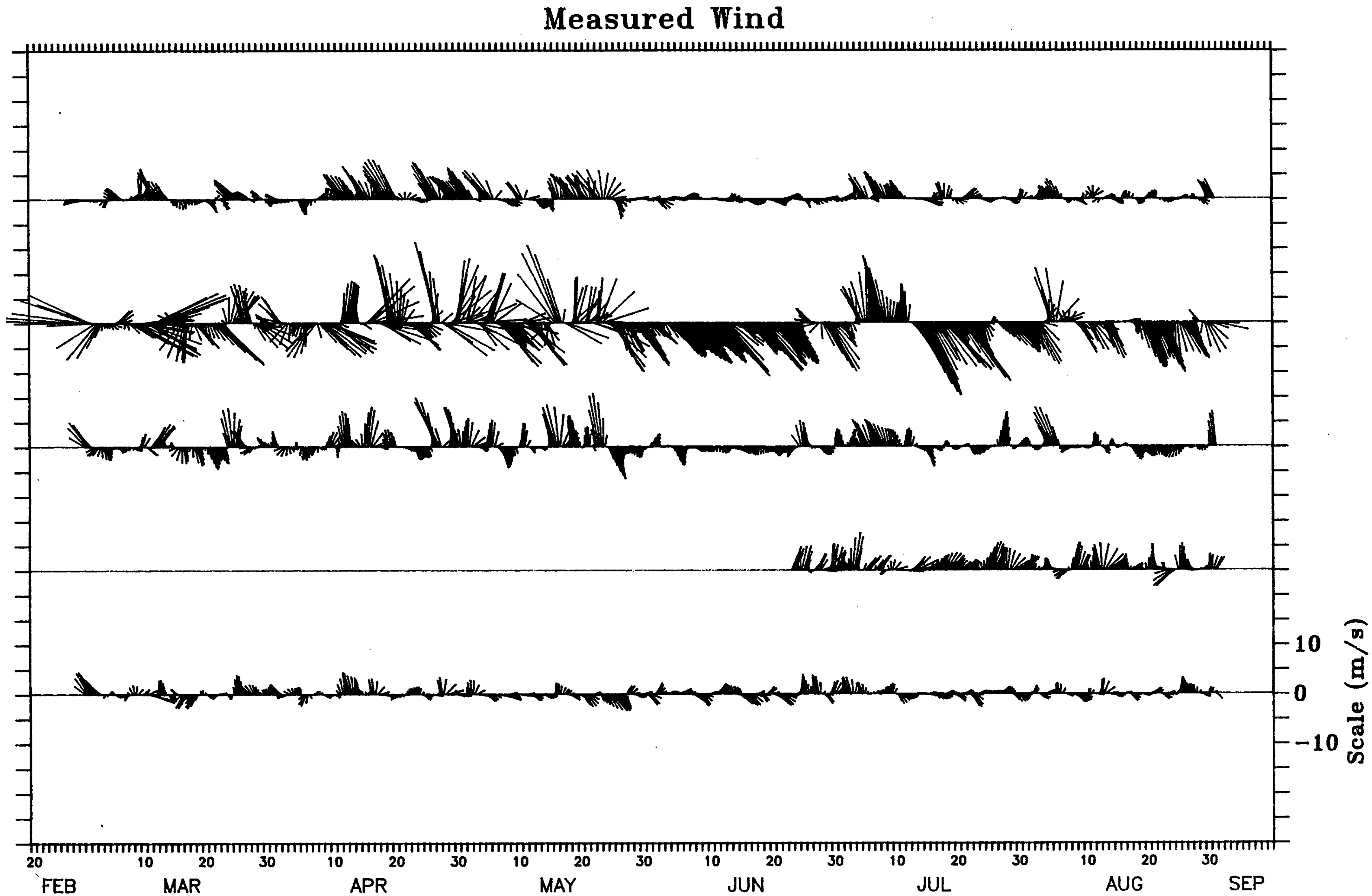


Figure 5A-H. Vector plots of selected CODE-2 measured winds.

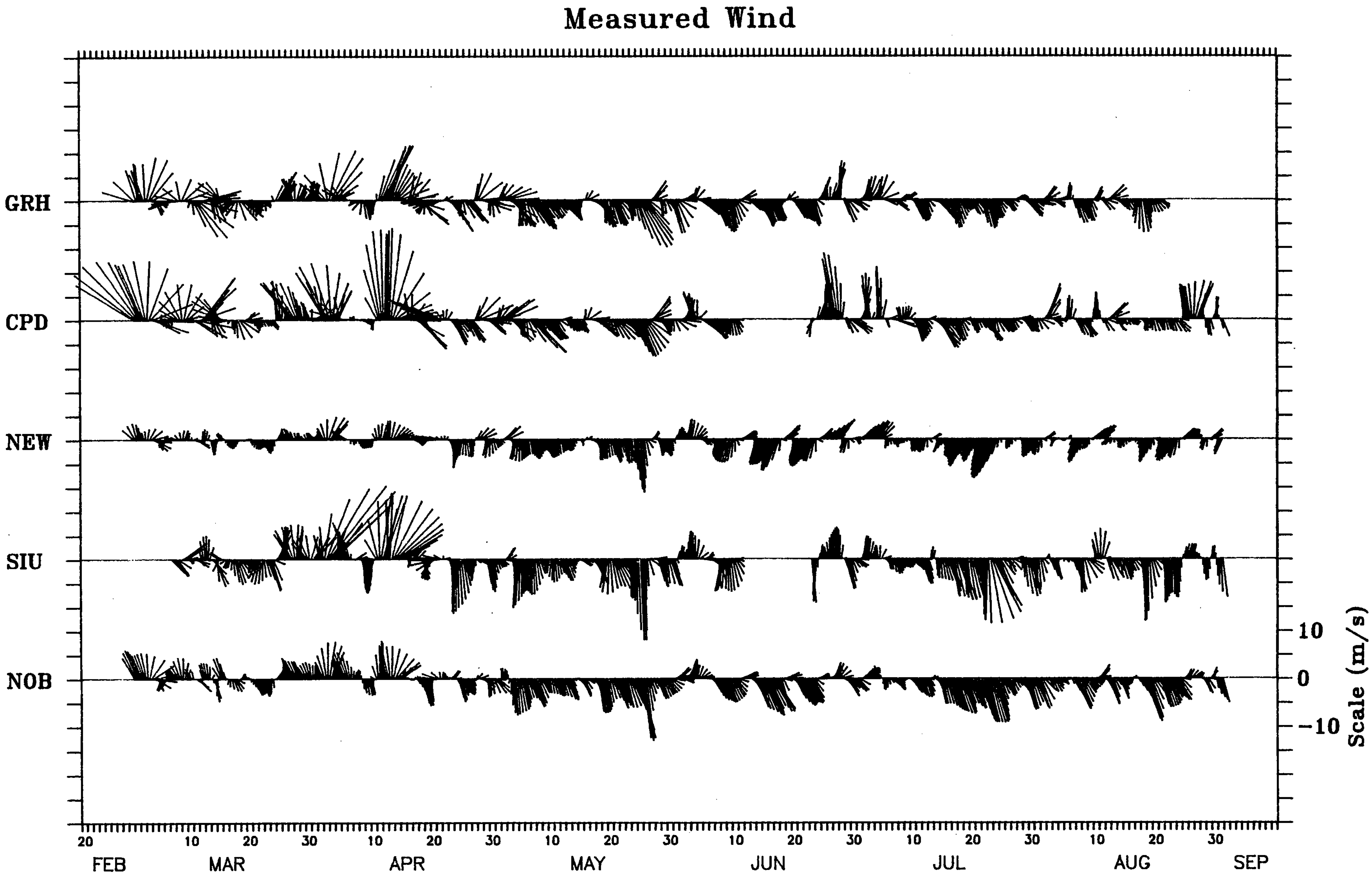
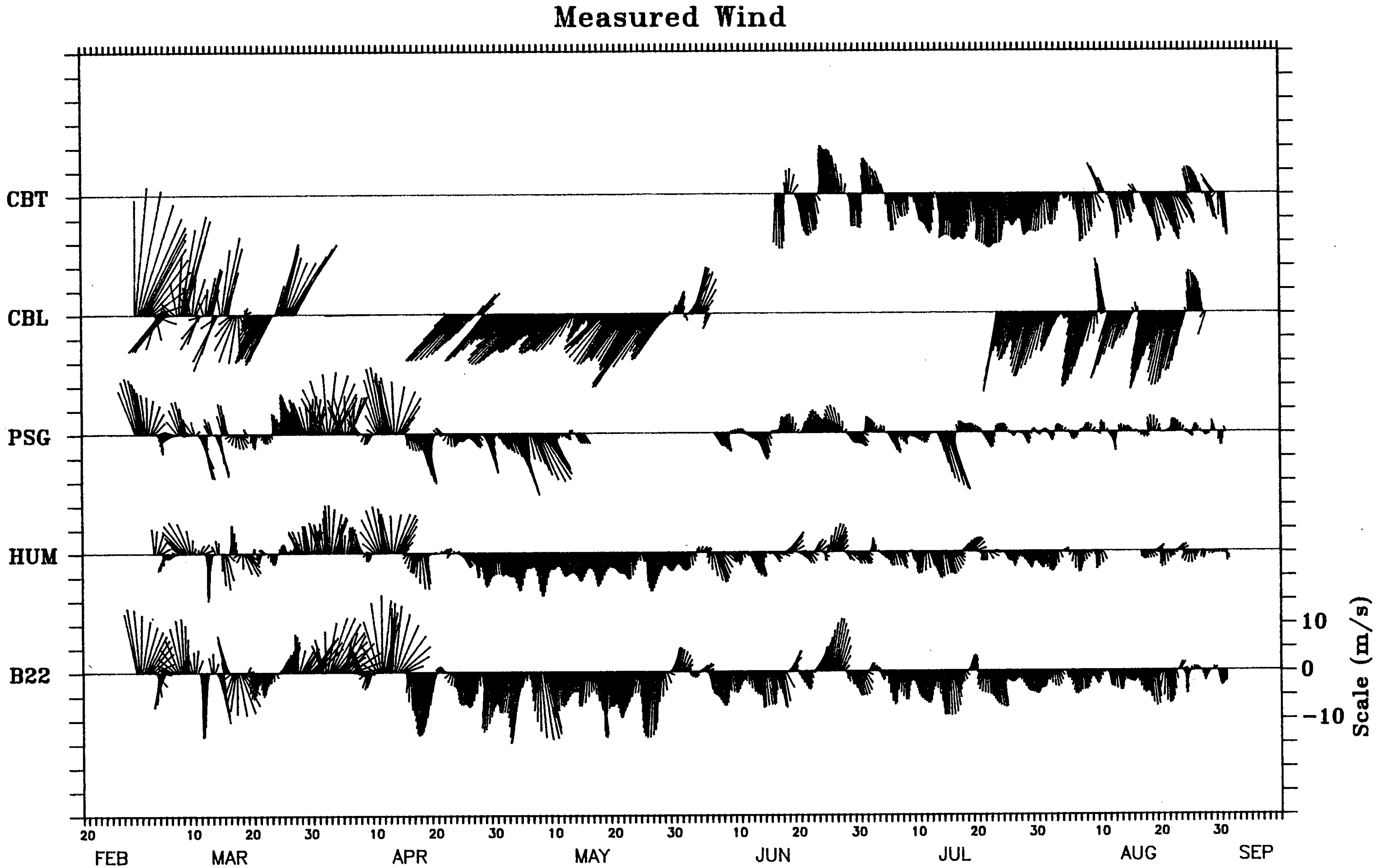

Measured Wind
GRH
CPD
NEW
SIU
NOB
20
10
20
30
10
20
30
10
20
30
10
20
30
10
20
30
10
20
30
FEB
MAR
APR
MAY
JUN
JUL
AUG
SEP
10
0
−10
Scale (m/s)

Figure 5B


Measured Wind
CBT
CBL
PSG
HUM
B22
10
0
-10
Scale (m/s)
20
10
20
30
10
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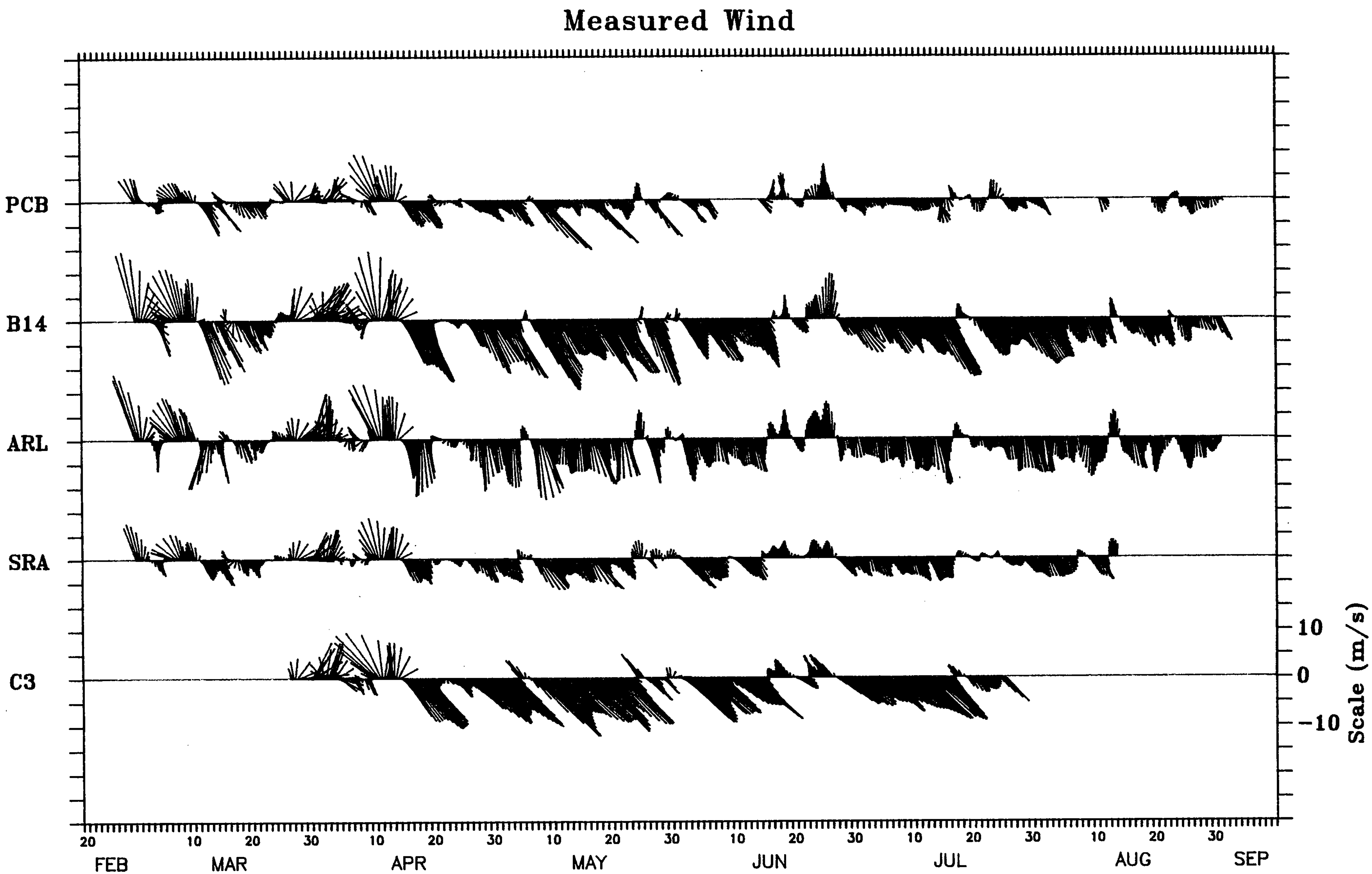
30
10
20
30
10
20
30
10
20
30
10
20
30
FEB
MAR
APR
MAY
JUN
JUL
AUG
SEP

Figure 5C



Measured Wind
PCB
B14
ARL
SRA
C3
10
0
−10
Scale (m/s)
20
10
20
30
10
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30
10
20
30
10
20
30
10
20
30
10
20
30
FEB
MAR
APR
MAY
JUN
JUL
AUG
SEP

Figure 5D

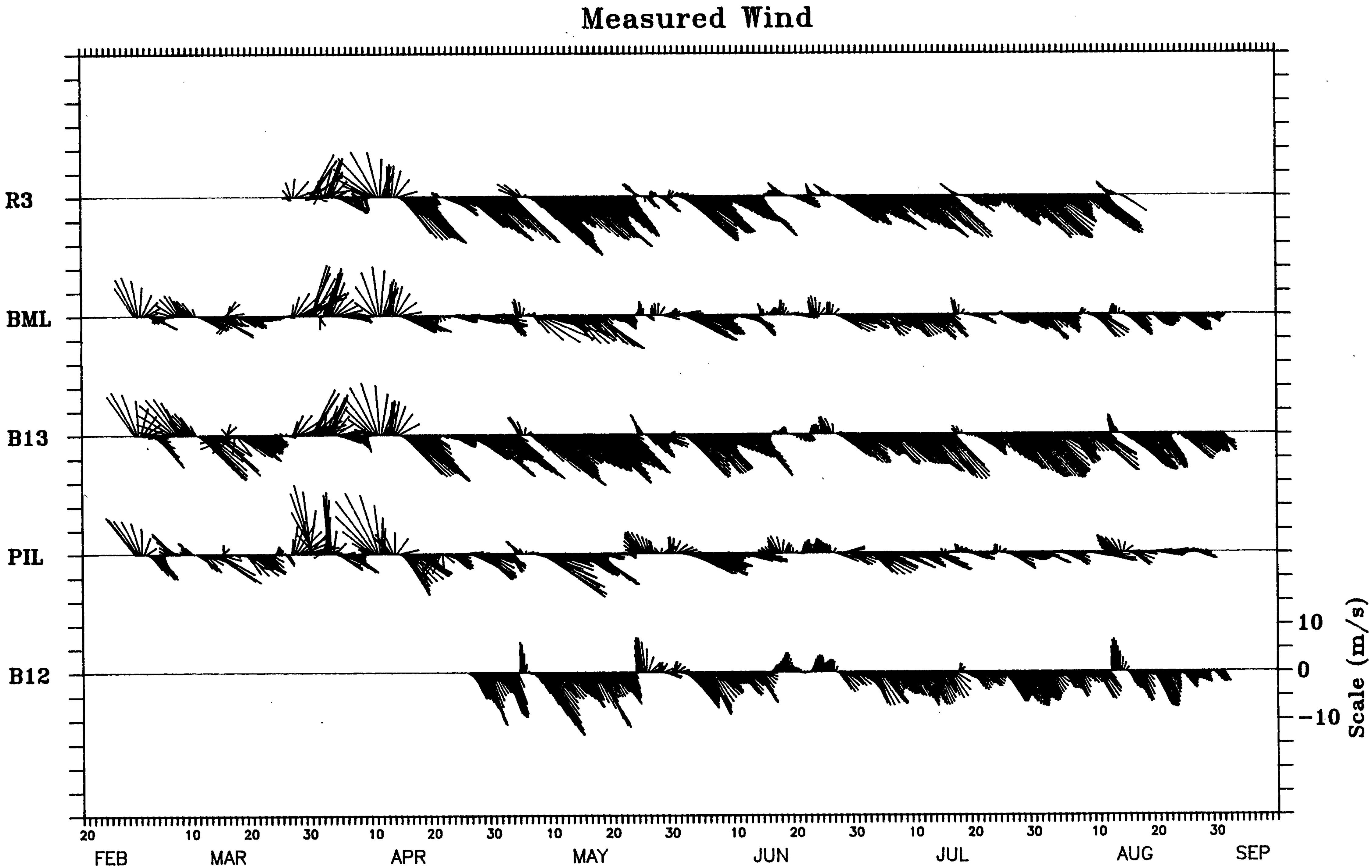

Measured Wind
R3
BML
B13
PIL
B12
10
0
-10
Scale (m/s)
20
10
20
30
10
20
30
10
20
30
10
20
30
10
20
30
10
20
30
FEB
MAR
APR
MAY
JUN
JUL
AUG
SEP

Figure 5E

Measured Wind

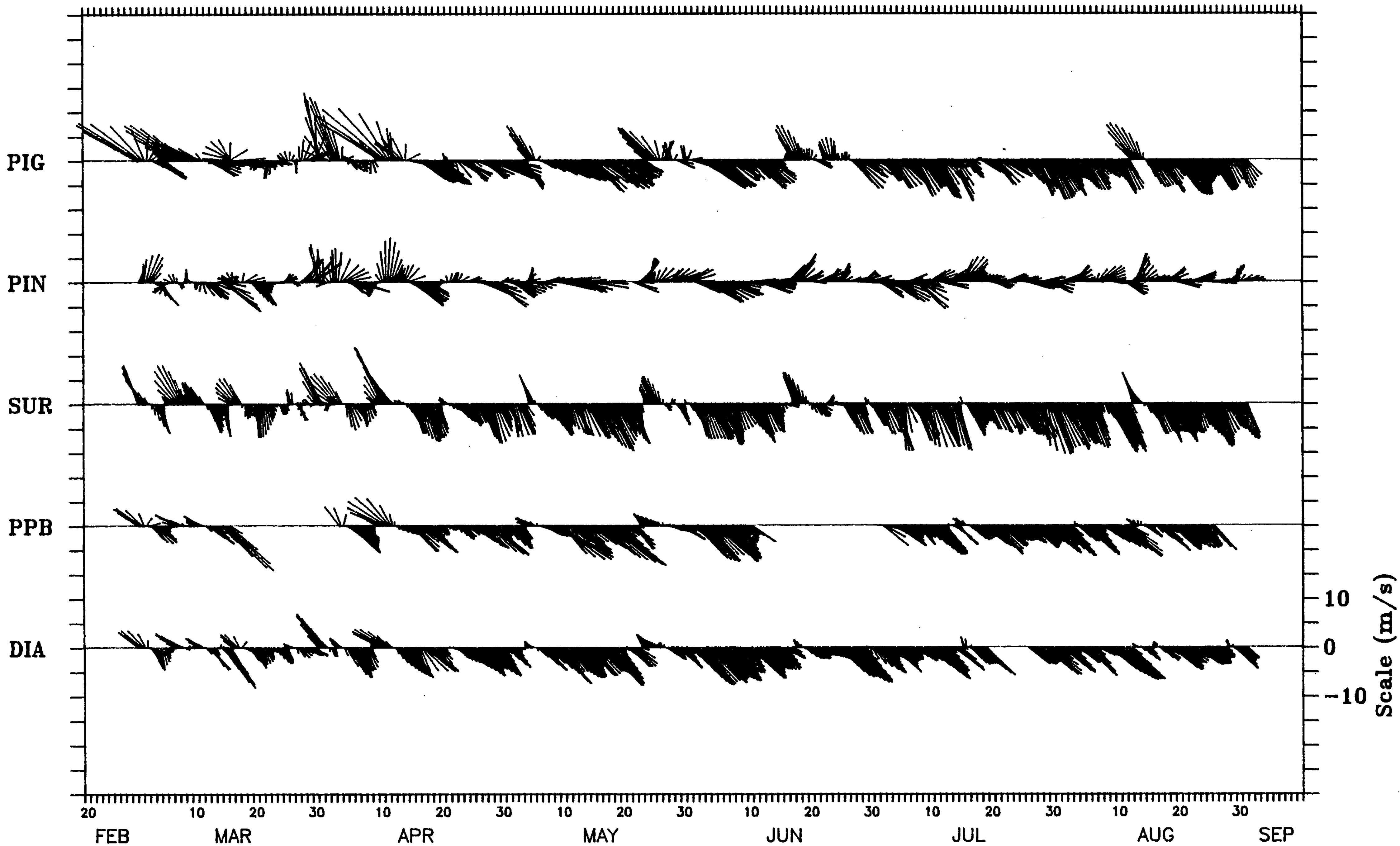
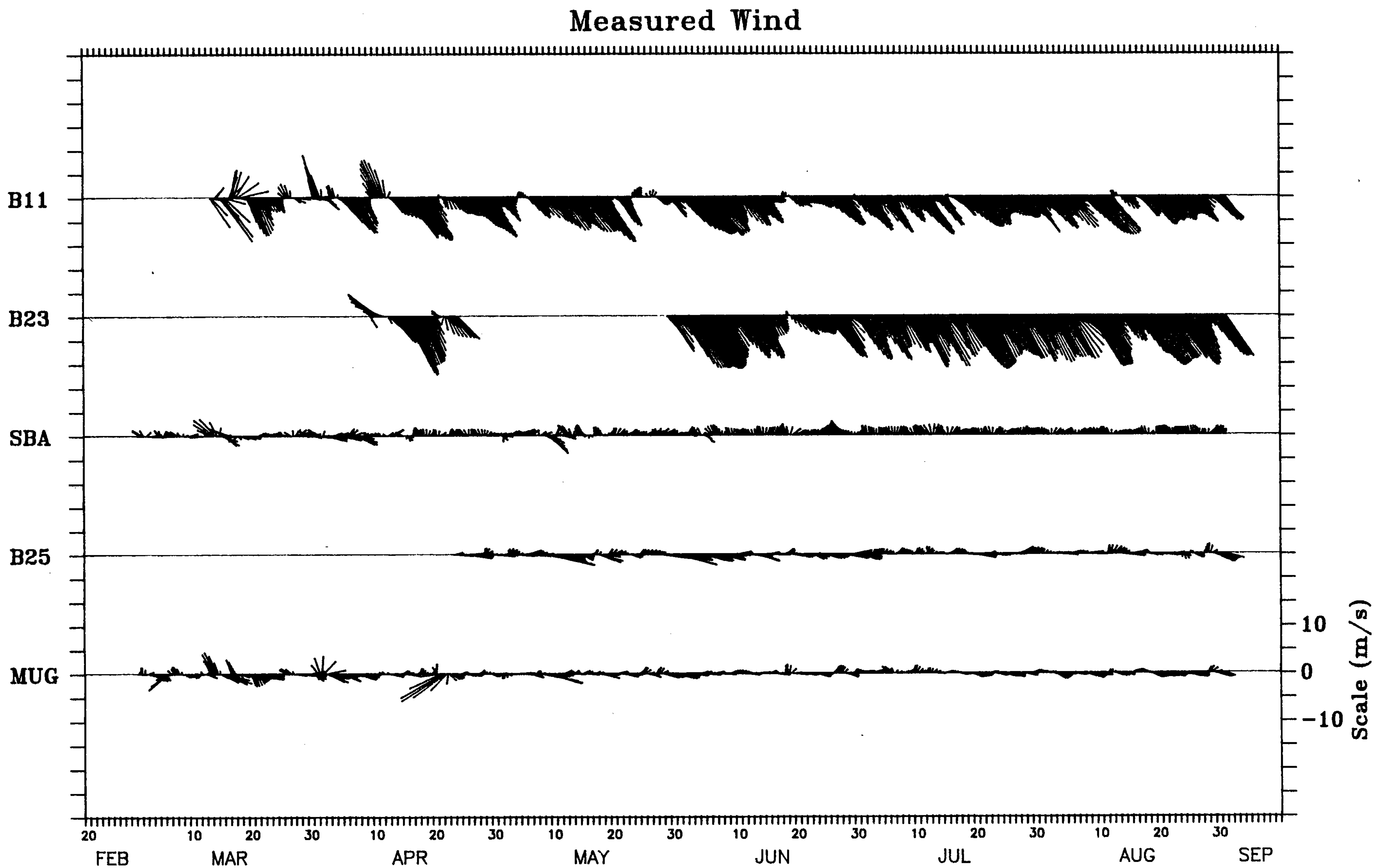


Figure 5F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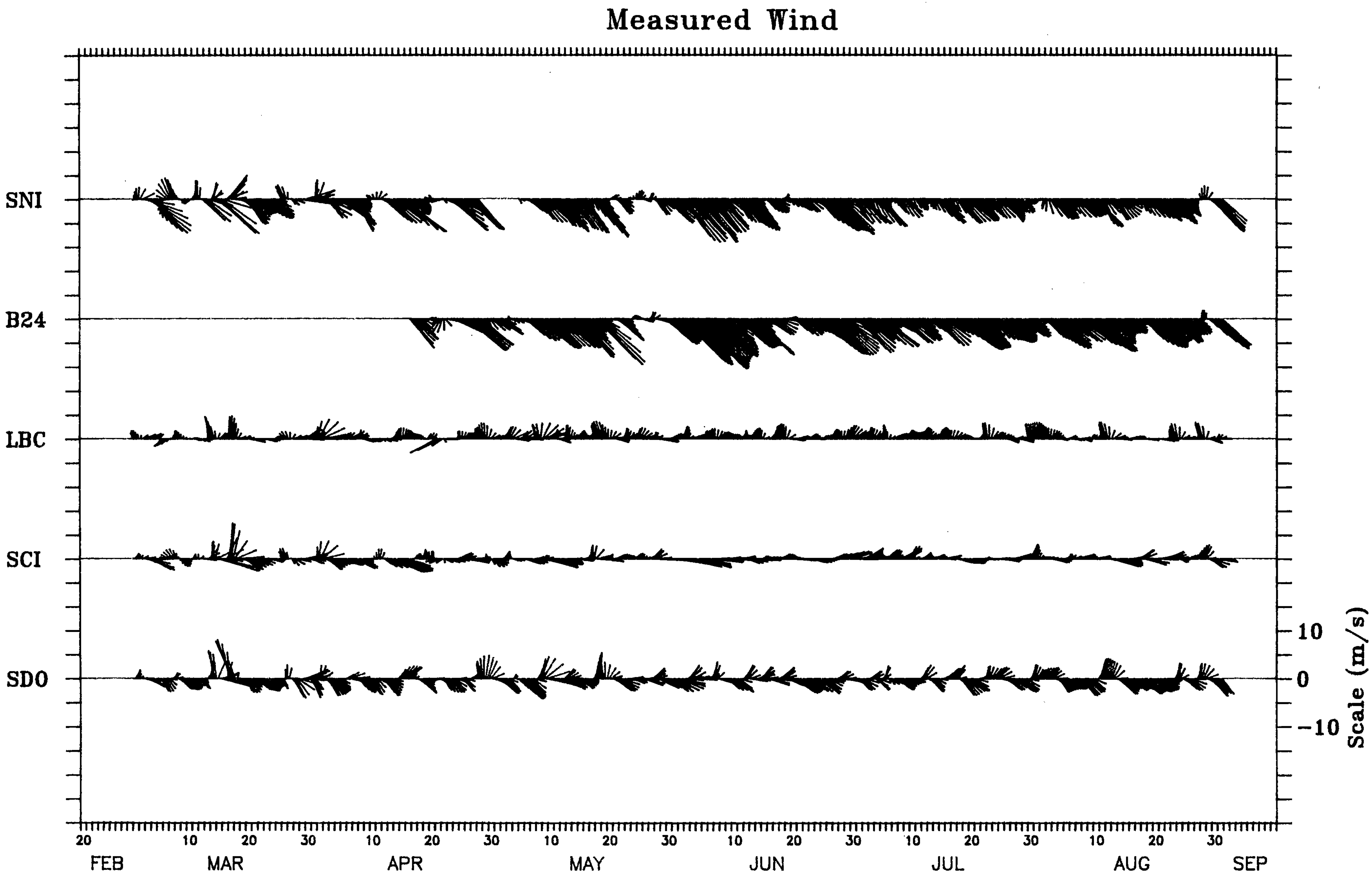
B23
SBA
B25
MUG
10
0
-10
Scale (m/s)
20
10
20
30
10
20
30
10
20
30
10
20
30
10
20
30
10
20
30
FEB
MAR
APR
MAY
JUN
JUL
AUG
SEP

Figure 5G


Measured Wind
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B24
LBC
SCI
SDO
10
0
−10
Scale (m/s)
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10
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10
20
30
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20
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10
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30
FEB
MAR
APR
MAY
JUN
JUL
AUG
SEP

Figure 5H

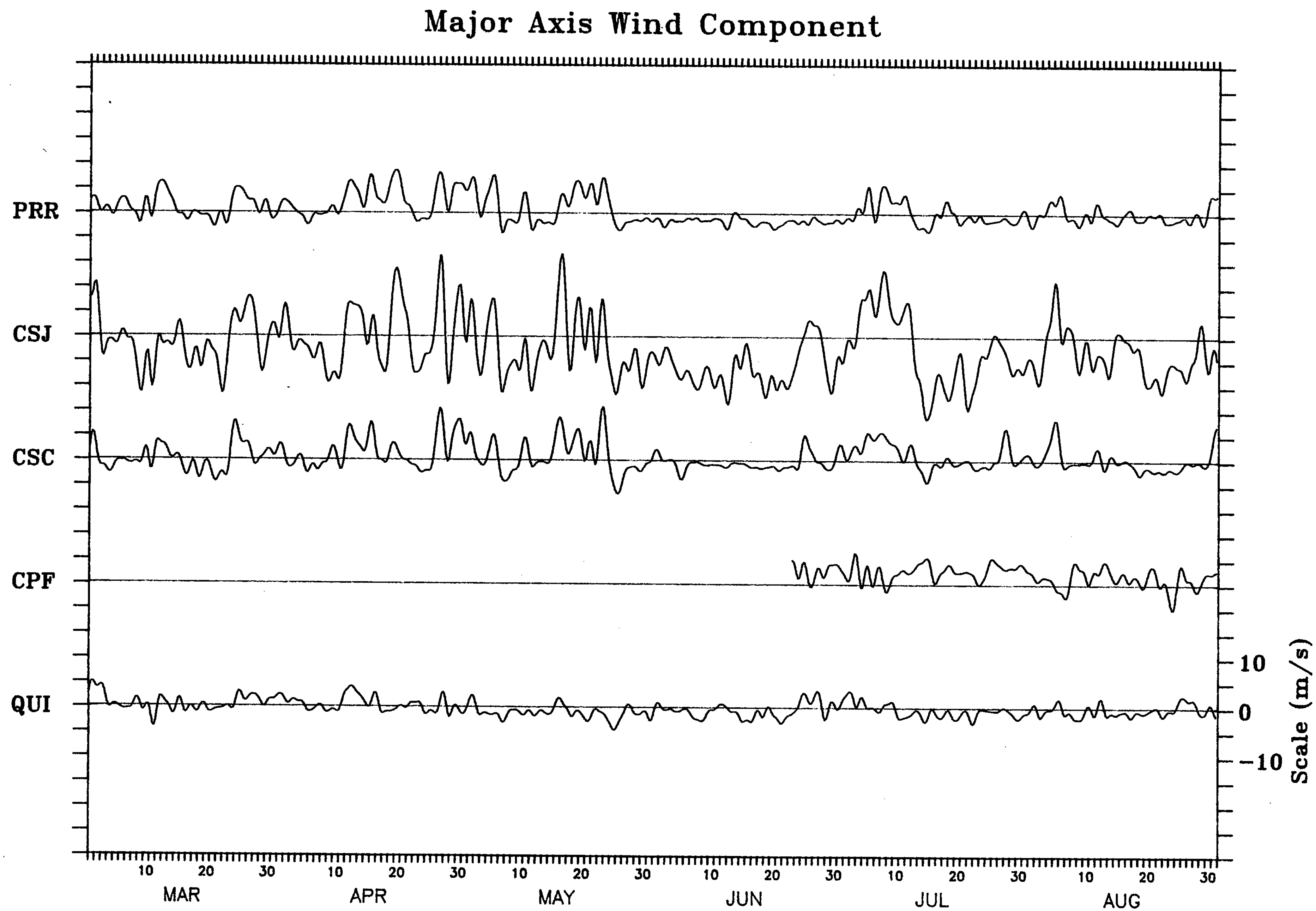


Figure 6A-P. Major and minor axis wind components from the same stations shown in Figure 5.

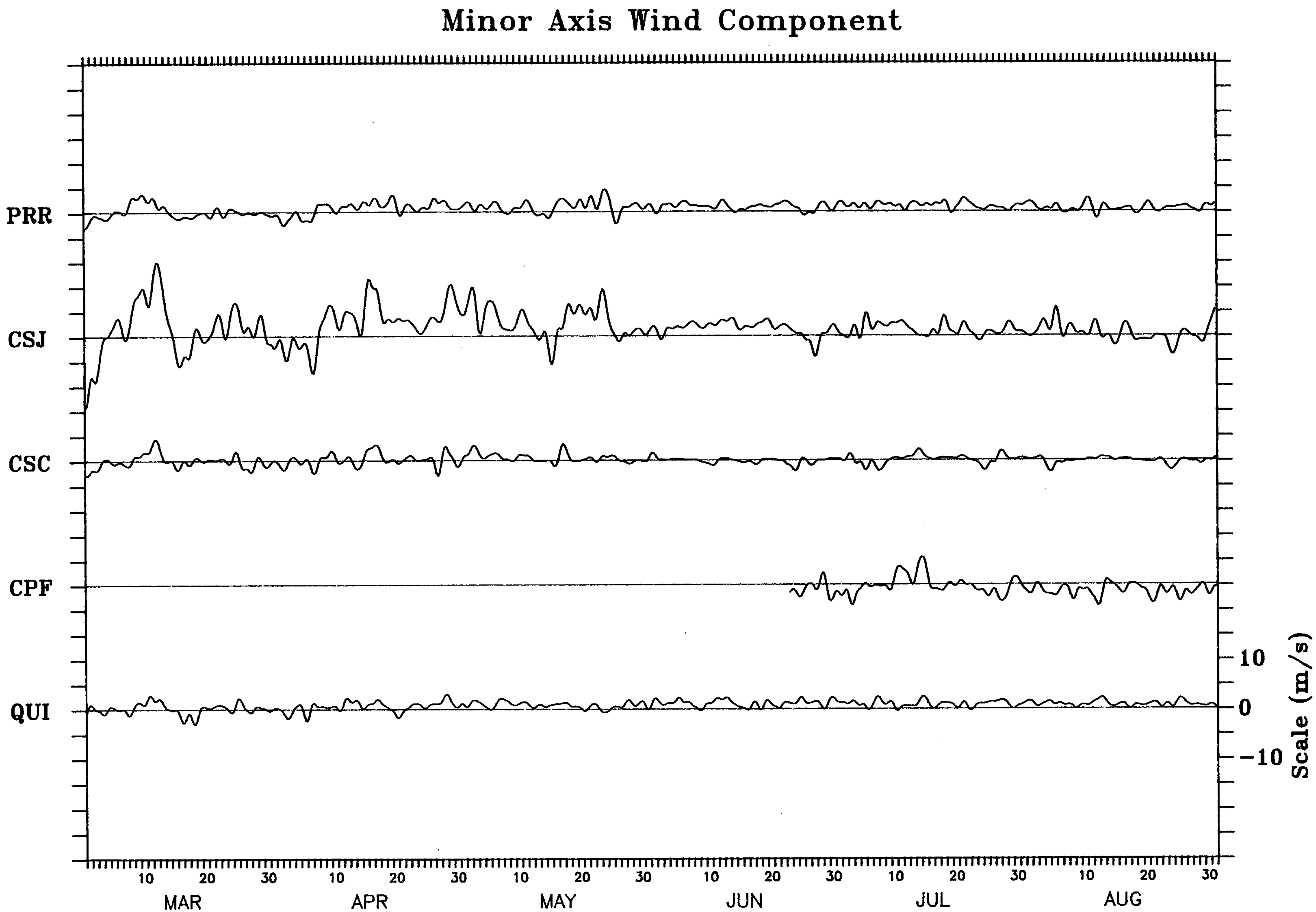
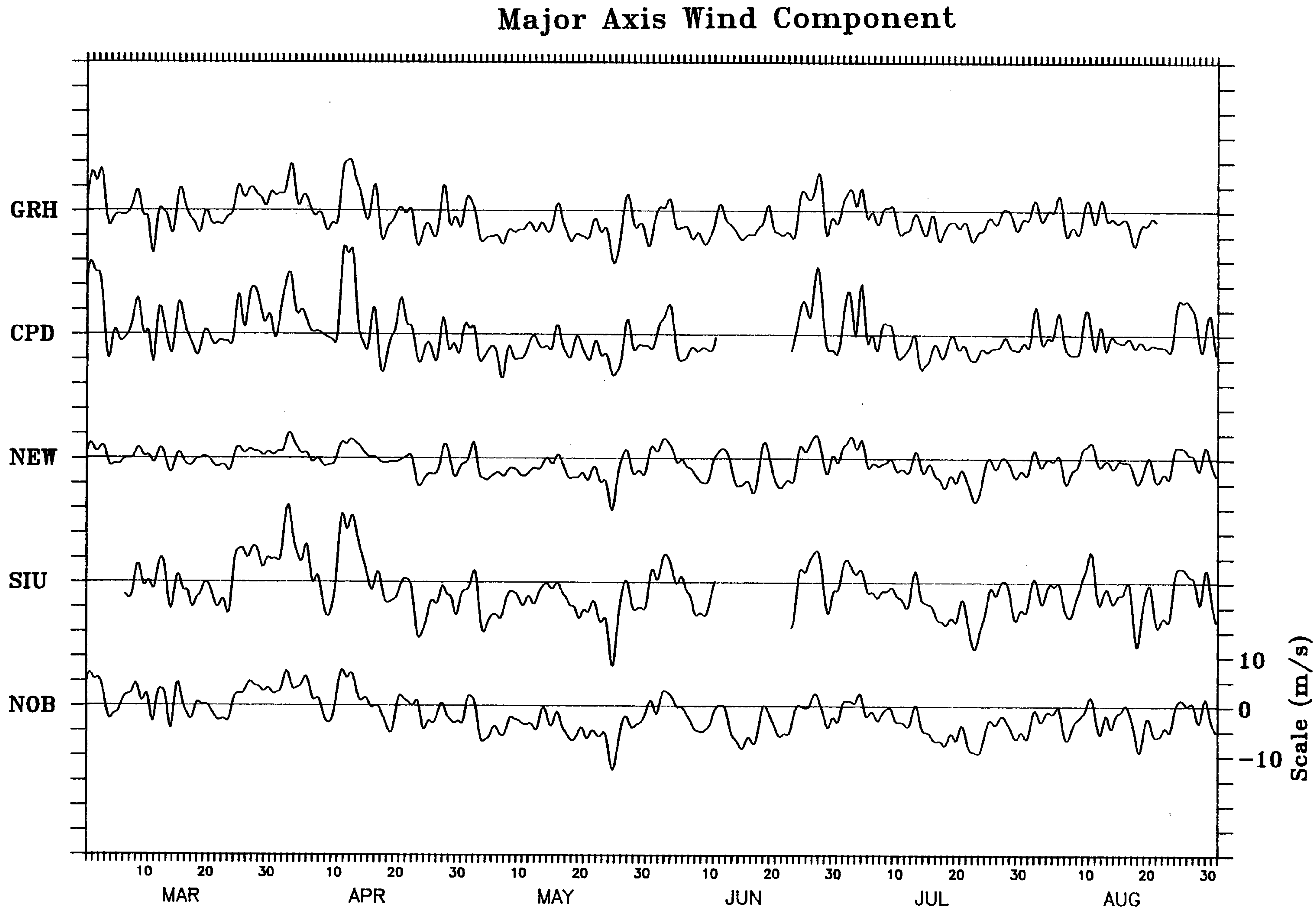
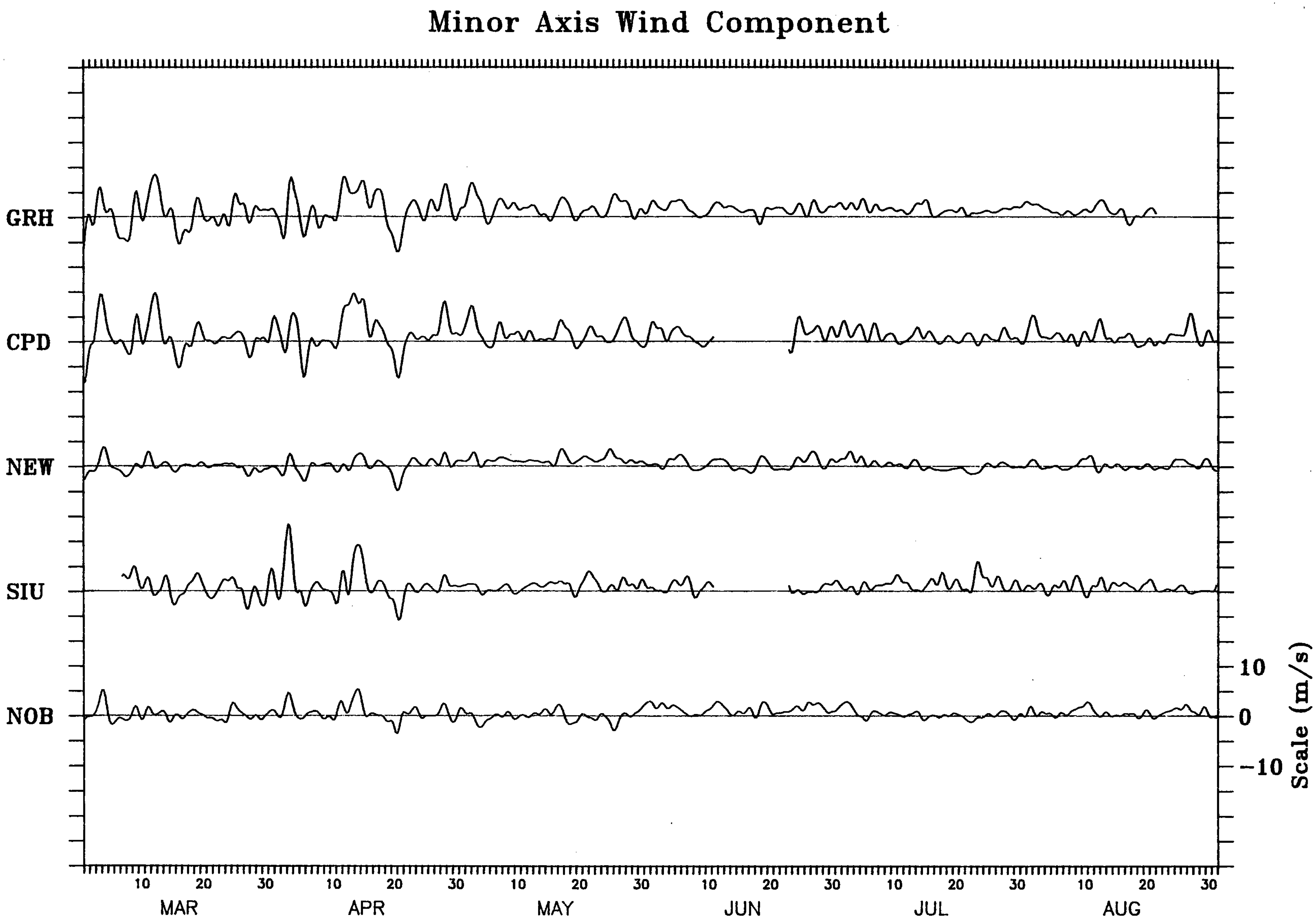

Minor Axis Wind Component
PRR
CSJ
CSC
CPF
QUI
10
0
−10
Scale (m/s)
10
20
30
MAR
APR
MAY
JUN
JUL
AUG

Figure 6B



Major Axis Wind Component
GRH
CPD
NEW
SIU
NOB
10
0
−10
Scale (m/s)
10
20
30
MAR
APR
MAY
JUN
JUL
AUG

Figure 6C



Minor Axis Wind Component
GRH
CPD
NEW
SIU
NOB
10
0
−10
Scale (m/s)
10
20
30
MAR
APR
MAY
JUN
JUL
AUG

Figure 6D

Major Axis Wind Component

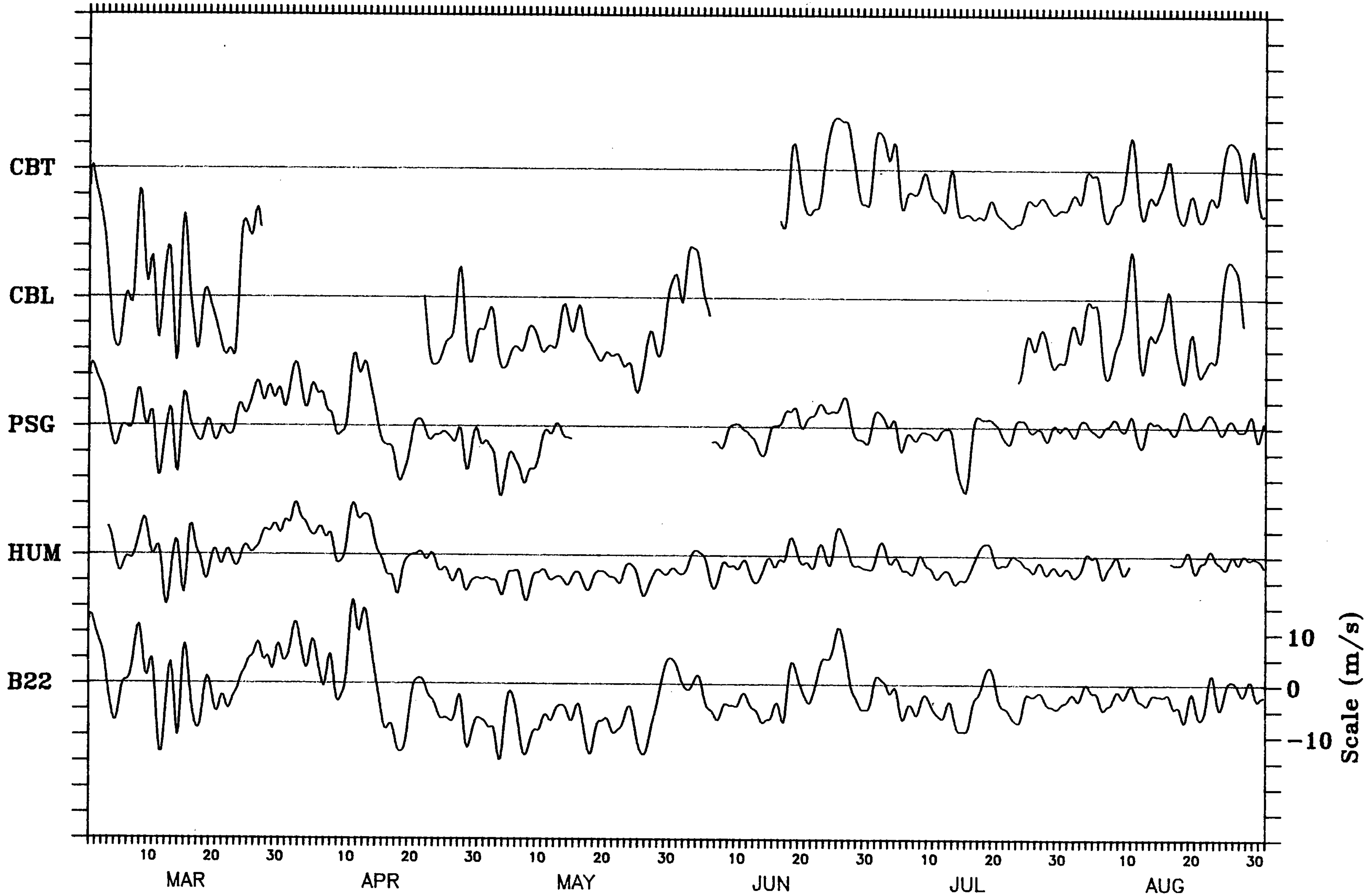
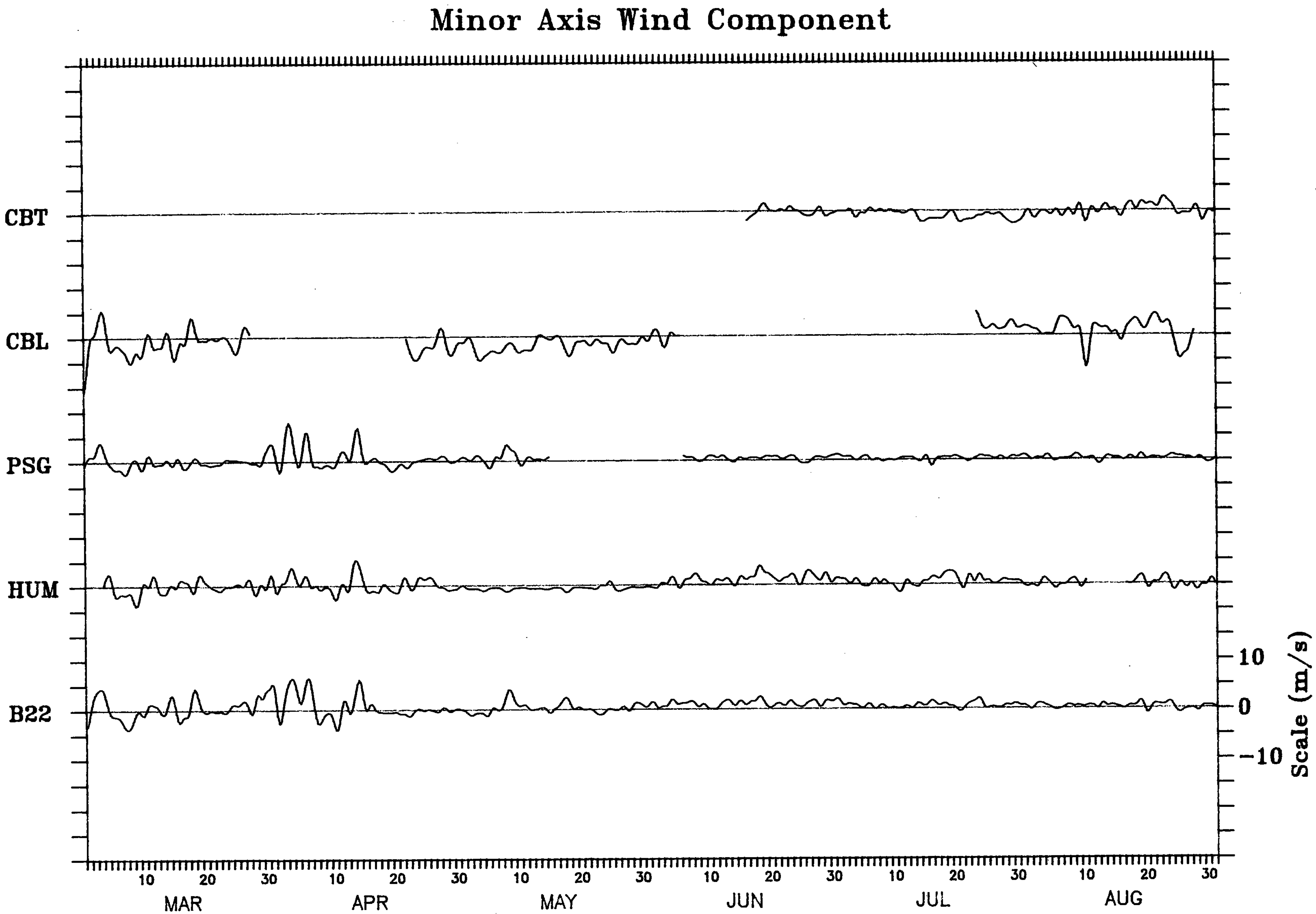


Figure 6E



Minor Axis Wind Component
CBT
CBL
PSG
HUM
B22
10
0
-10
Scale (m/s)
10 20 30 10 20 30 10 20 30 10 20 30 10 20 30 10 20 30
MAR
APR
MAY
JUN
JUL
AUG

Figure 6F

Major Axis Wind Component

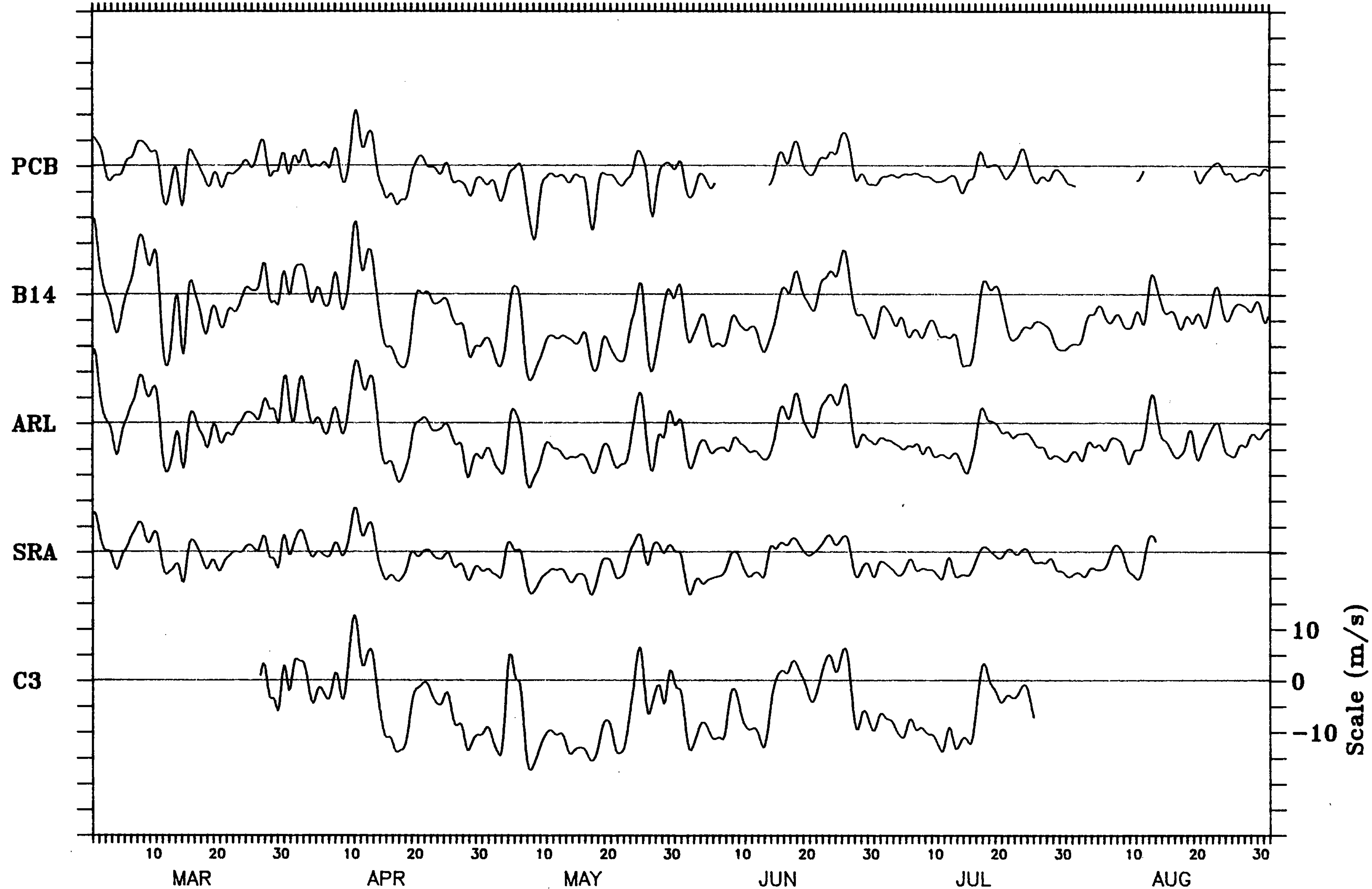
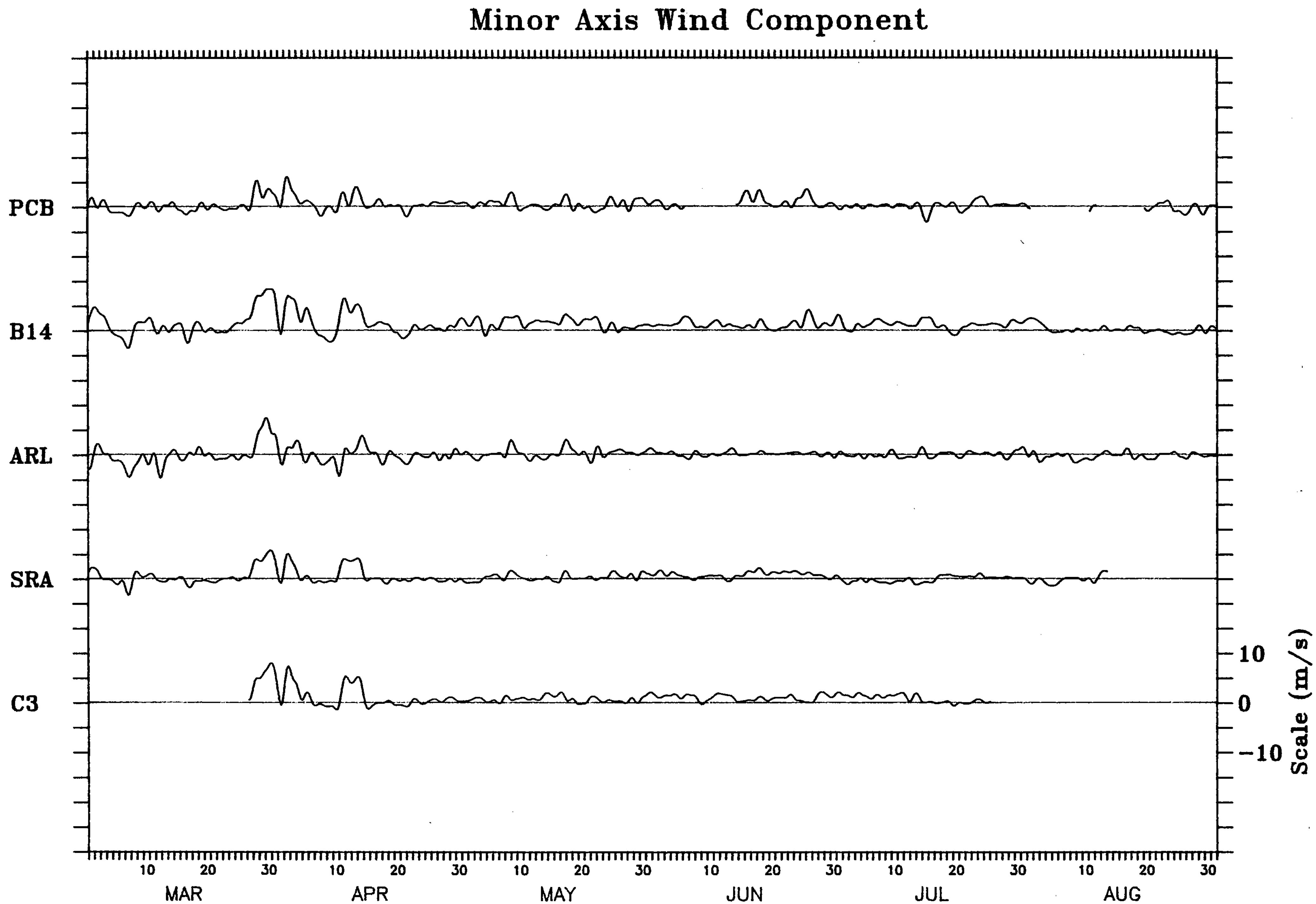


Figure 6G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PCB
B14
ARL
SRA
C3
10
0
−10
Scale (m/s)
10 20 30 10 20 30 10 20 30 10 20 30 10 20 30 10 20 30
MAR
APR
MAY
JUN
JUL
AUG

Figure 6H

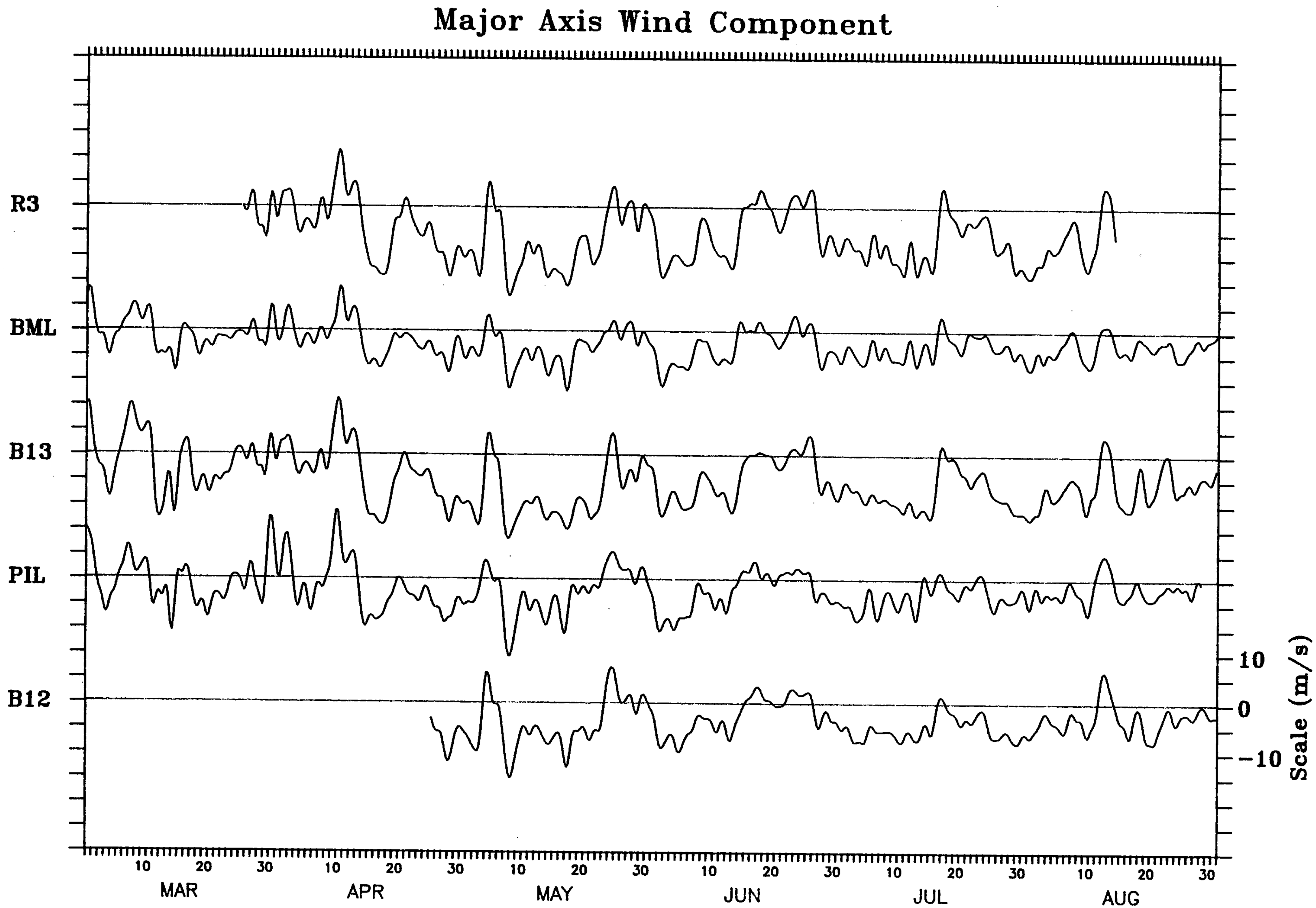
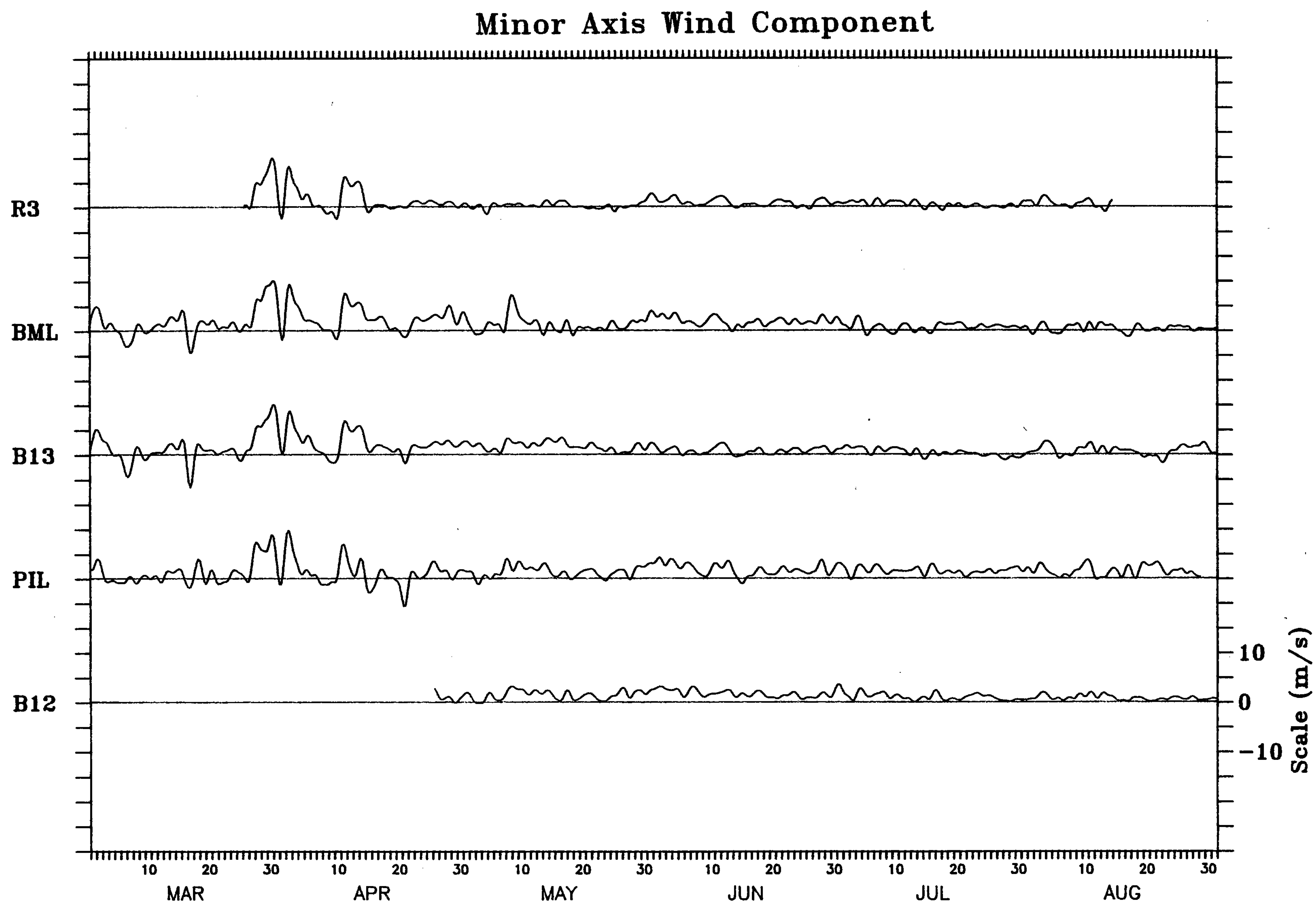

Major Axis Wind Component
R3
BML
B13
PIL
B12
10
0
−10
Scale (m/s)
10
20
30
MAR
APR
MAY
JUN
JUL
AUG

Figure 6I



Minor Axis Wind Component
R3
BML
B13
PIL
B12
10
0
-10
Scale (m/s)
10 20 30 10 20 30 10 20 30 10 20 30 10 20 30 10 20 30
MAR
APR
MAY
JUN
JUL
AUG

Figure 6J

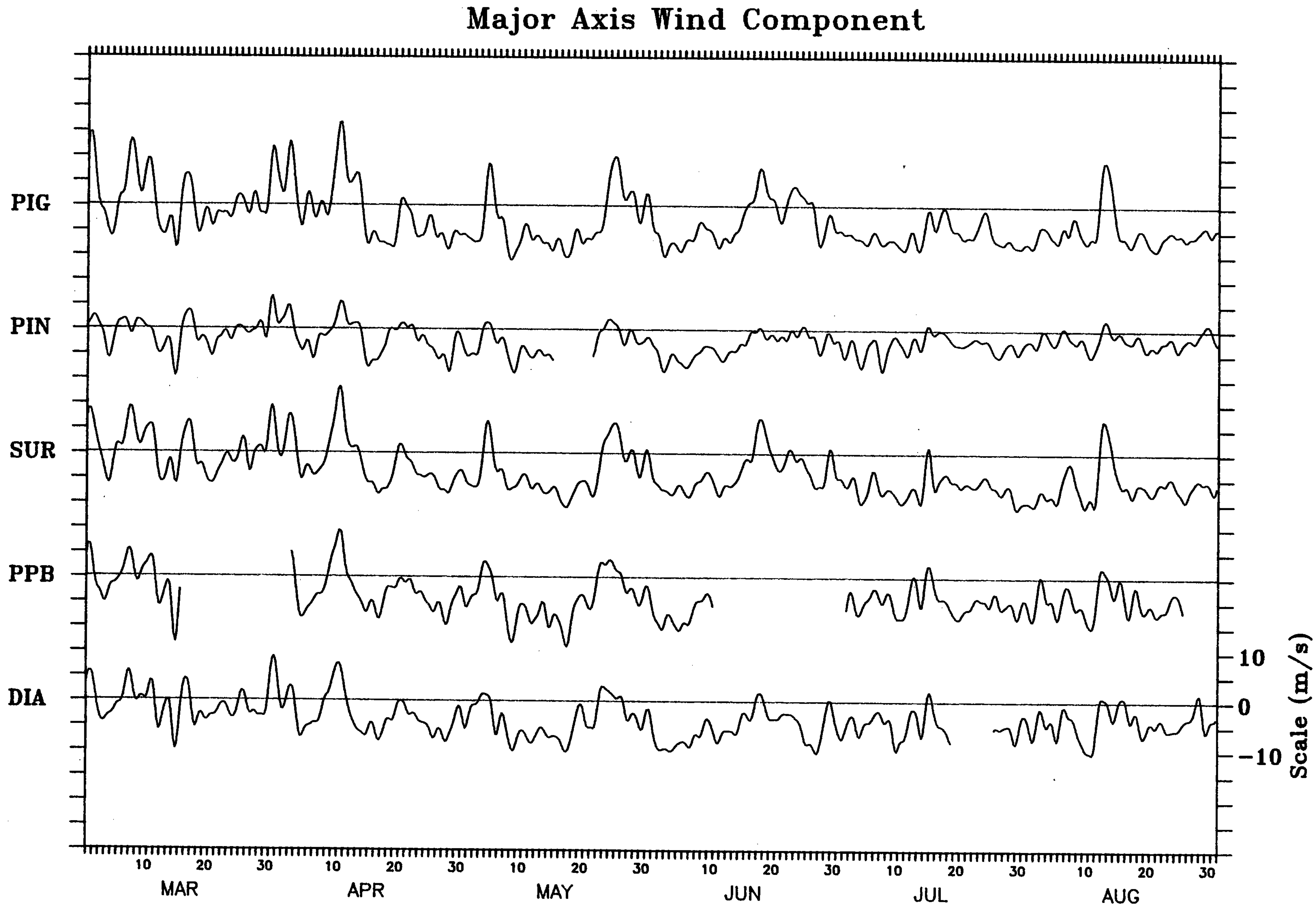

Major Axis Wind Component
PIG
PIN
SUR
PPB
DIA
10
0
-10
Scale (m/s)
10 20 30 10 20 30 10 20 30 10 20 30 10 20 30 10 20 30
MAR
APR
MAY
JUN
JUL
AUG

Figure 6K

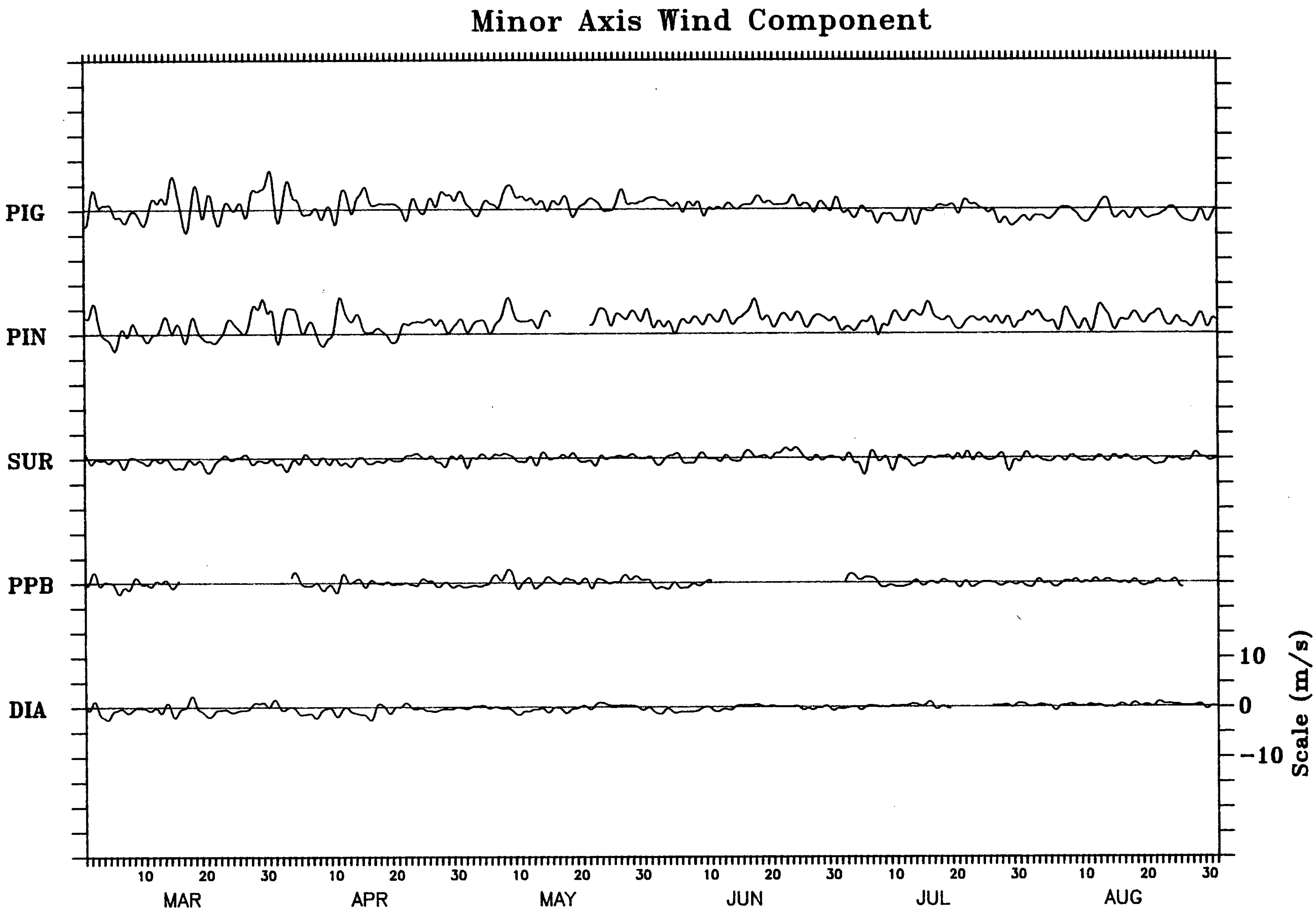

Minor Axis Wind Component
PIG
PIN
SUR
PPB
DIA
10
0
-10
Scale (m/s)
10 20 30 10 20 30 10 20 30 10 20 30 10 20 30 10 20 30
MAR
APR
MAY
JUN
JUL
AUG

Figure 6L

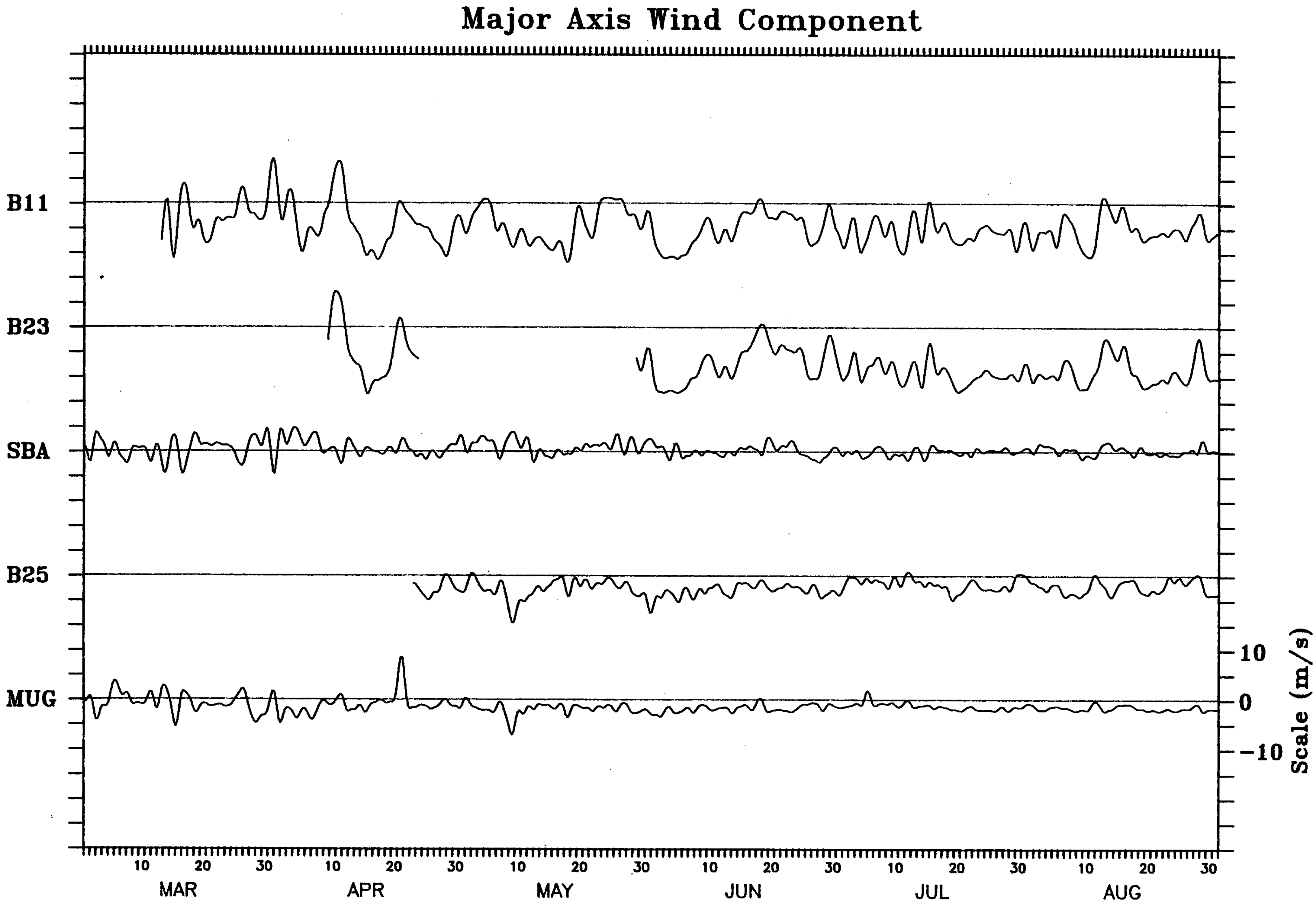

Major Axis Wind Component
B11
B23
SBA
B25
MUG
10
0
-10
Scale (m/s)
10
20
30
10
20
30
10
20
30
10
20
30
10
20
30
10
20
30
MAR
APR
MAY
JUN
JUL
AUG

Figure 6M

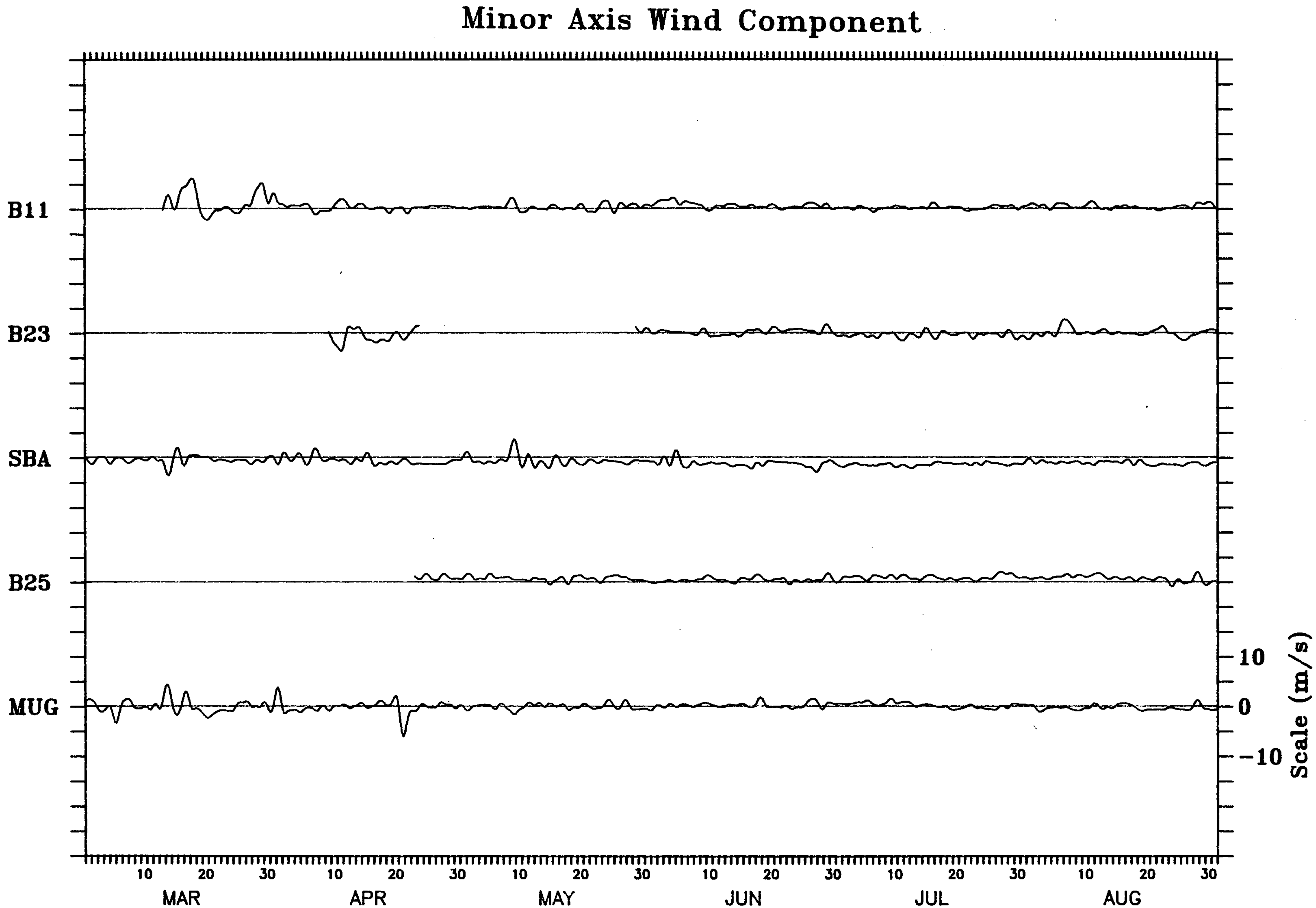

Minor Axis Wind Component
B11
B23
SBA
B25
MUG
10
0
−10
Scale (m/s)
10 20 30 10 20 30 10 20 30 10 20 30 10 20 30 10 20 30
MAR APR MAY JUN JUL AUG

Figure 6N

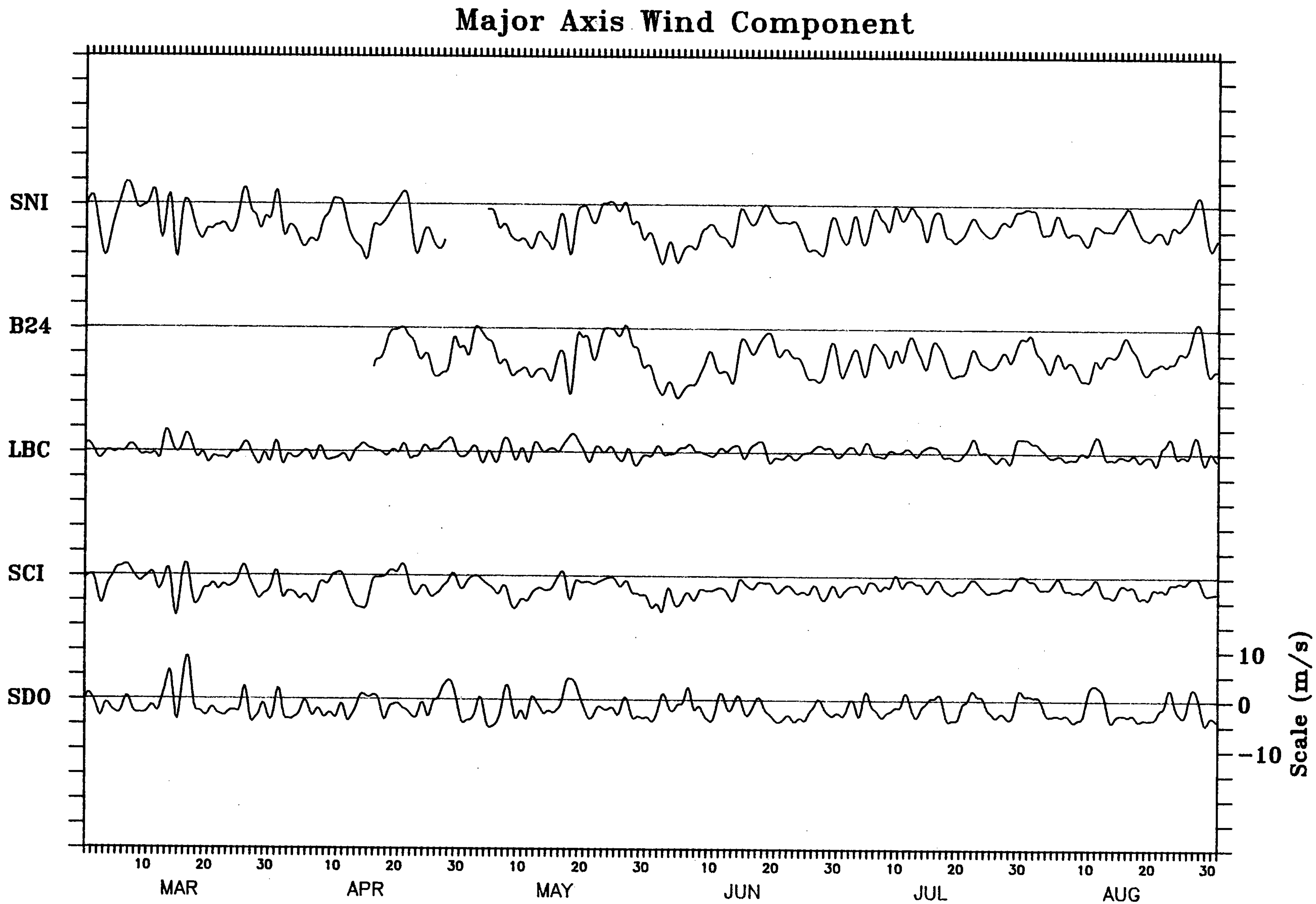

Major Axis Wind Component
SNI
B24
LBC
SCI
SDO
10
0
-10
Scale (m/s)
10 20 30 10 20 30 10 20 30 10 20 30 10 20 30 10 20 30
MAR
APR
MAY
JUN
JUL
AUG

Figure 60

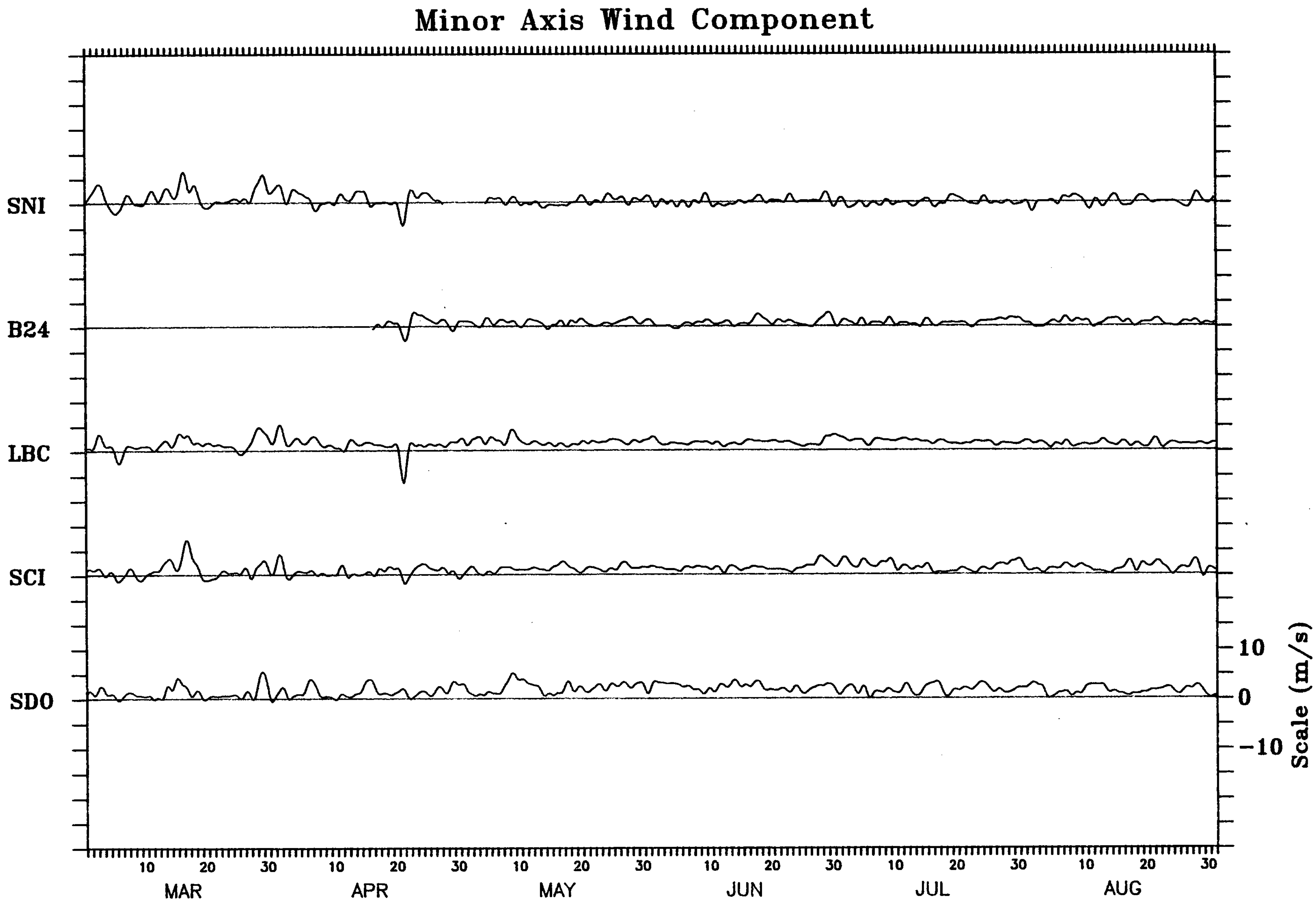

Minor Axis Wind Component
SNI
B24
LBC
SCI
SDO
10
0
−10
Scale (m/s)
10 20 30 10 20 30 10 20 30 10 20 30 10 20 30 10 20 30
MAR
APR
MAY
JUN
JUL
AUG

Figure 6P

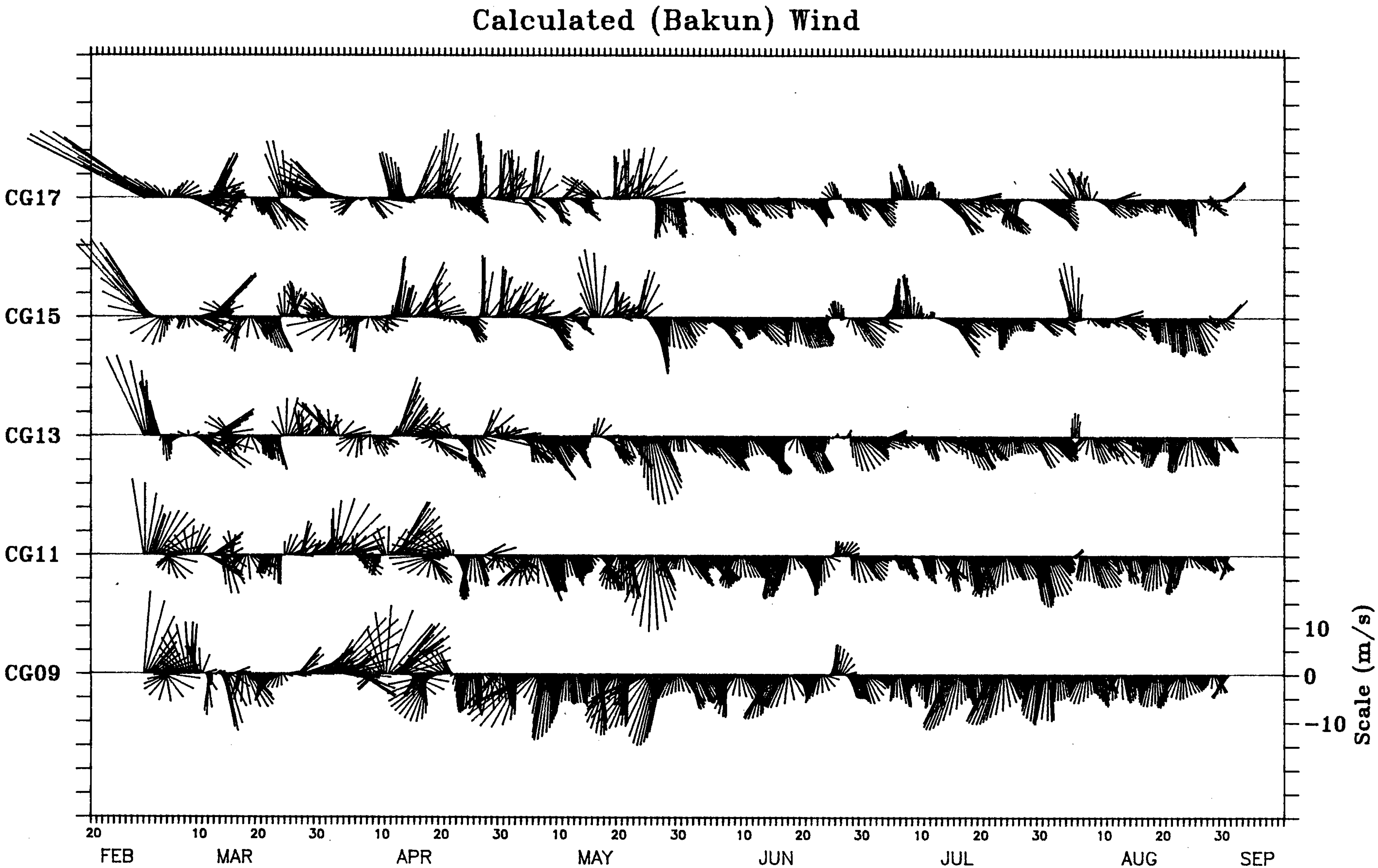


Figure 7A-B. Vector plots of CODE-2 calculated (Bakun) winds from selected points of the CODE analysis grid.

Calculated (Bakun) Wind

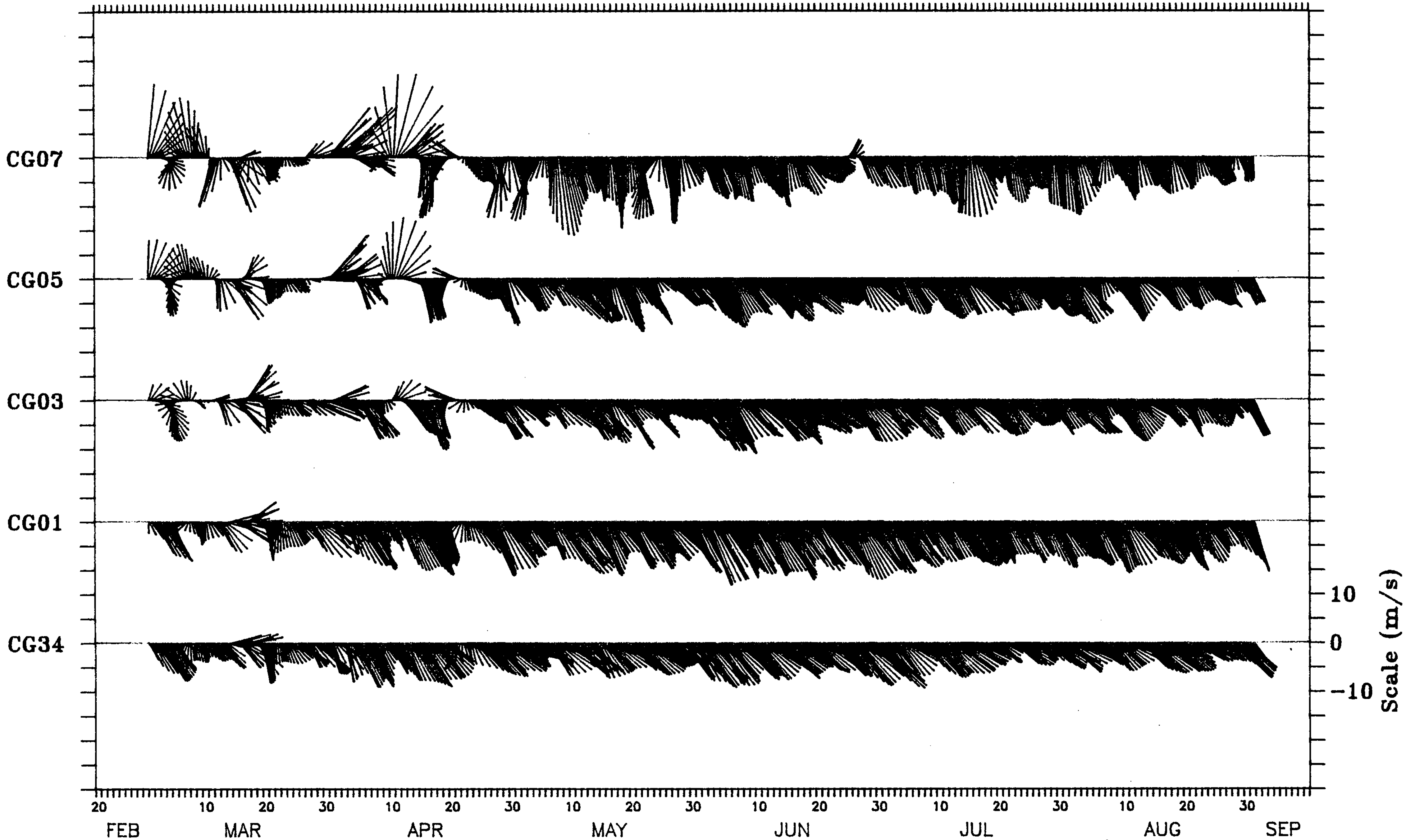


Figure 7B

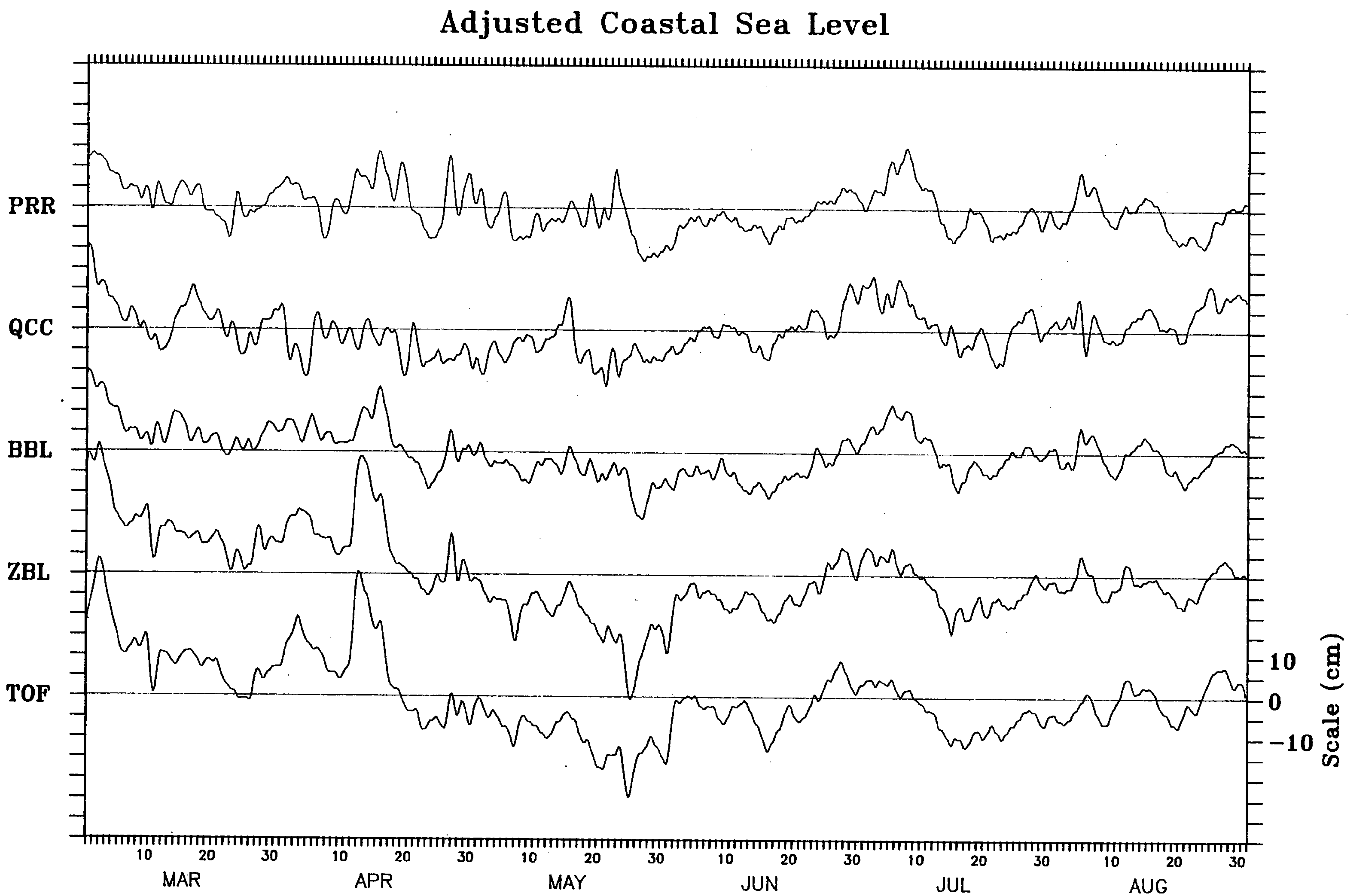


Figure 8A-E. Demeaned CODE-2 adjusted coastal sea level at selected stations.

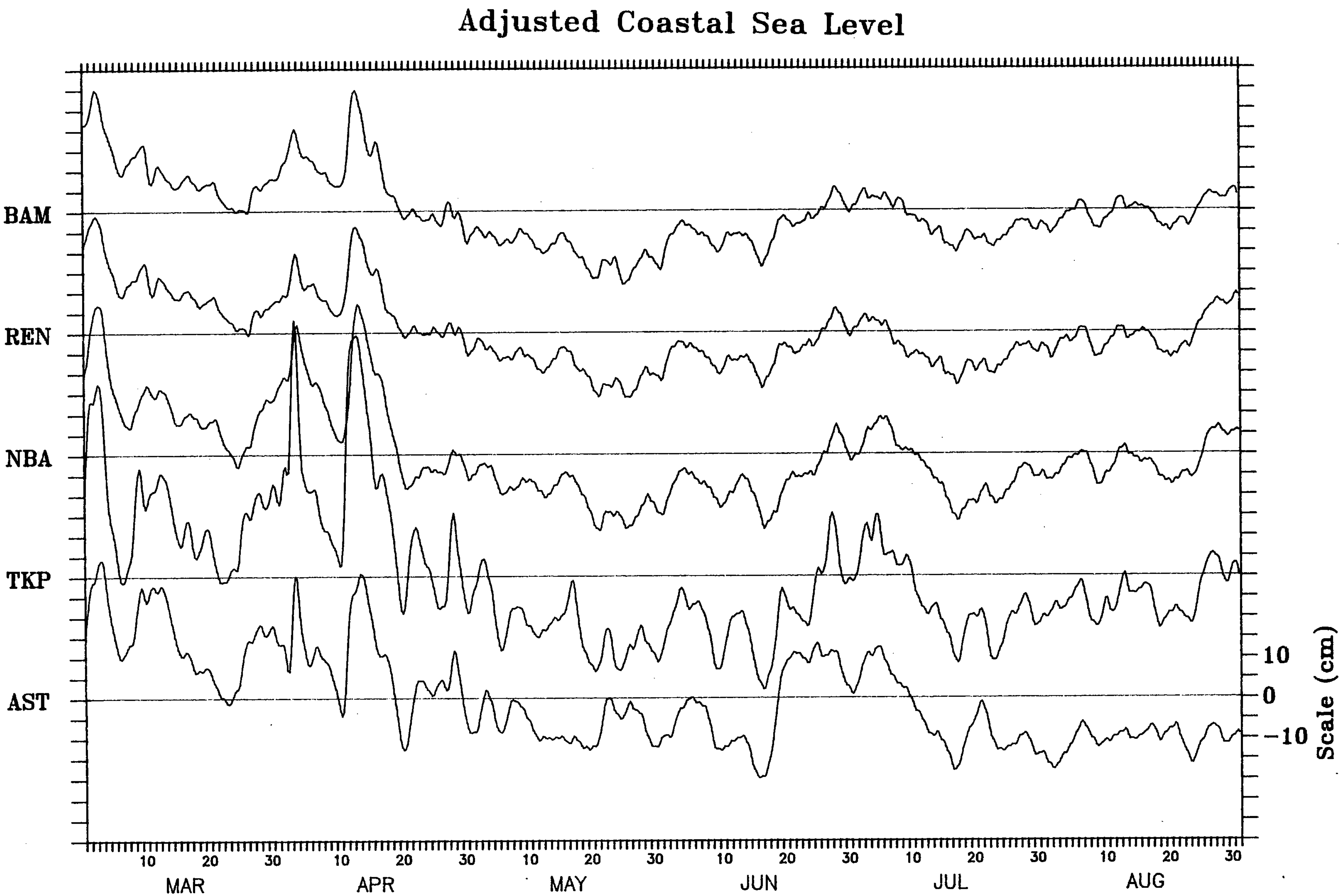

Adjusted Coastal Sea Level
BAM
REN
NBA
TKP
AST
10
0
-10
Scale (cm)
10
20
30
10
20
30
10
20
30
10
20
30
10
20
30
10
20
30
MAR
APR
MAY
JUN
JUL
AUG

Figure 8B

Adjusted Coastal Sea Level

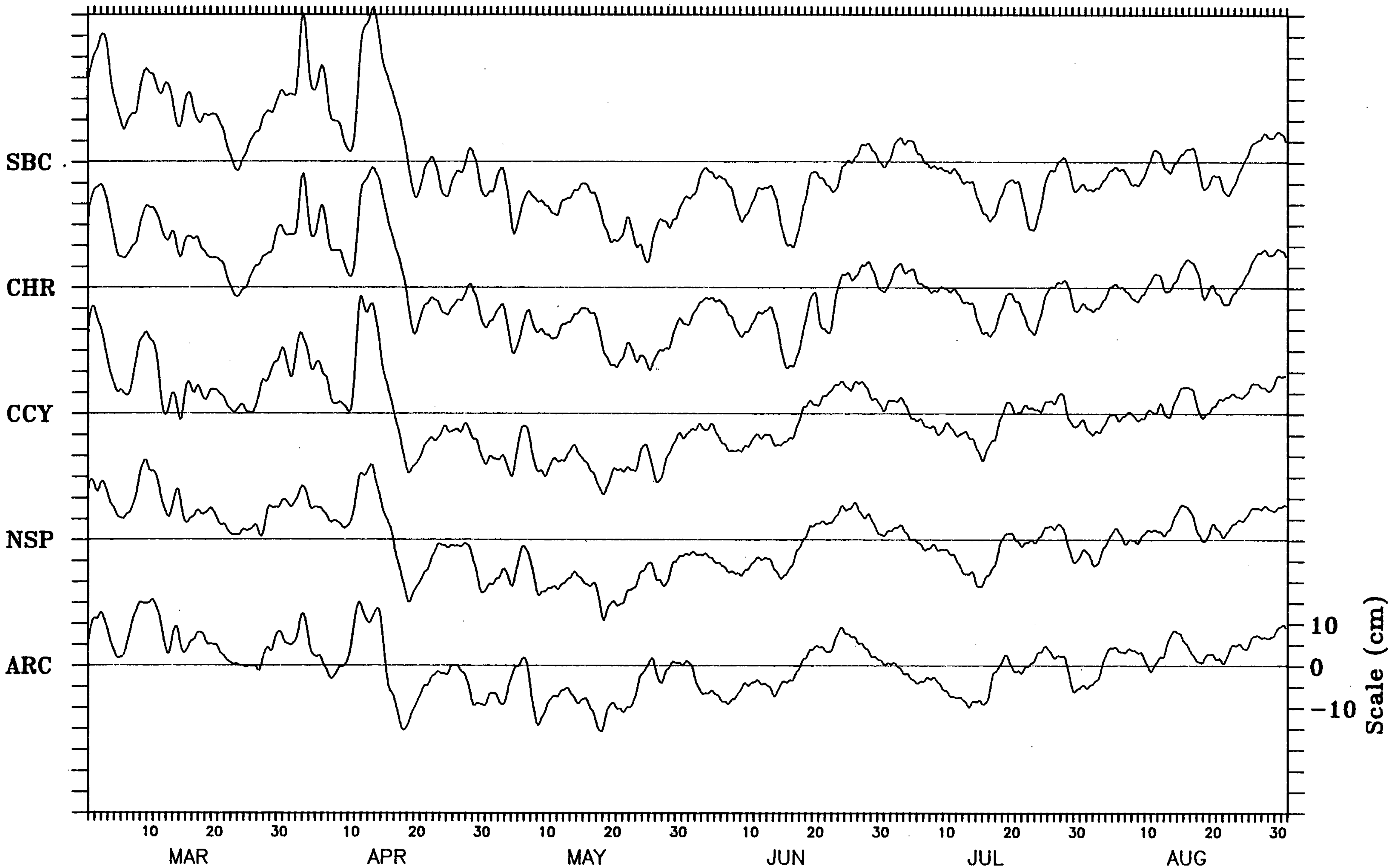


Figure 8C

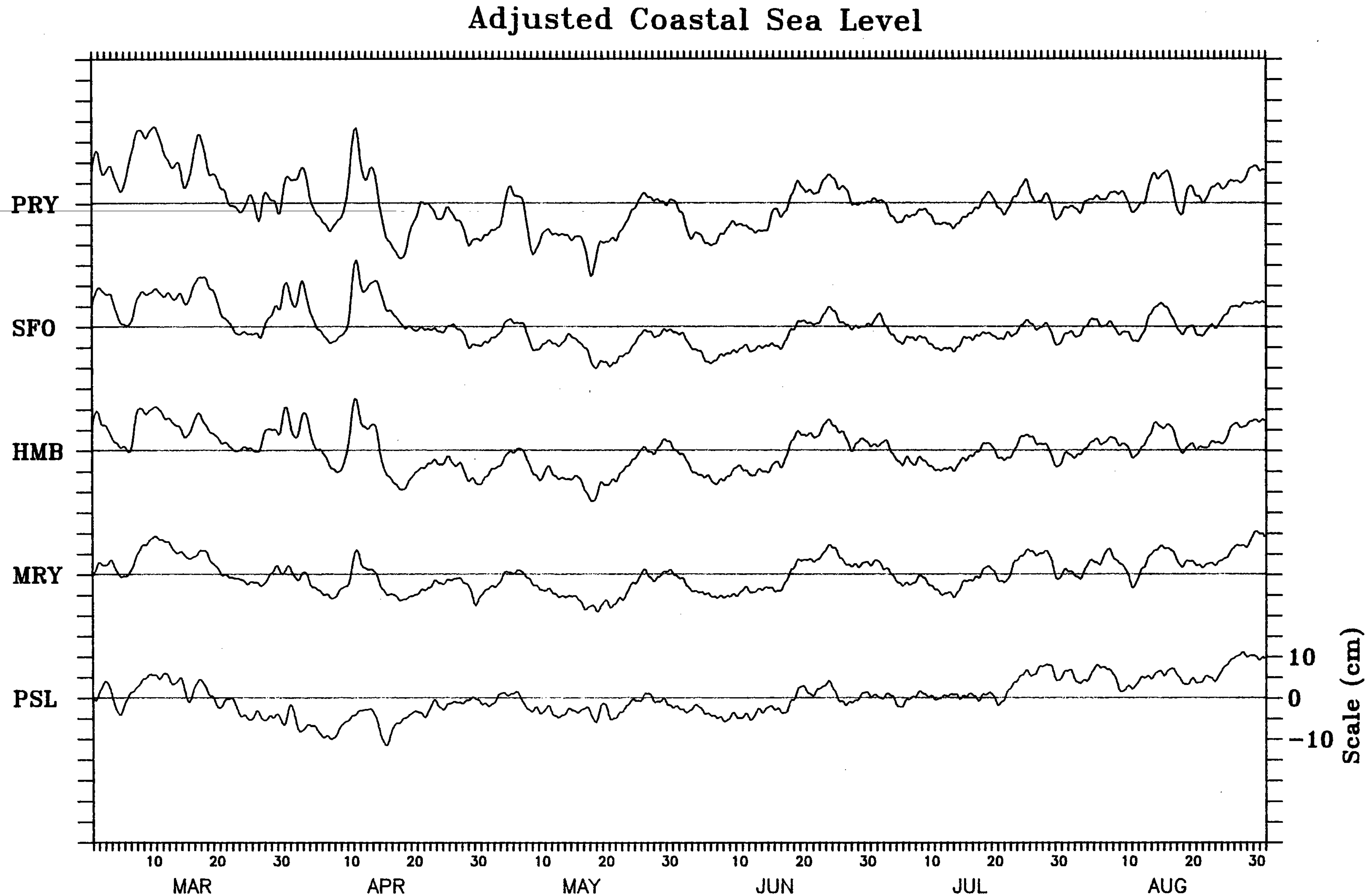

Adjusted Coastal Sea Level
PRY
SFO
HMB
MRY
PSL
10
0
−10
Scale (cm)
10 20 30 10 20 30 10 20 30 10 20 30 10 20 30 10 20 30
MAR
APR
MAY
JUN
JUL
AUG

Figure 8D

Adjusted Coastal Sea Level

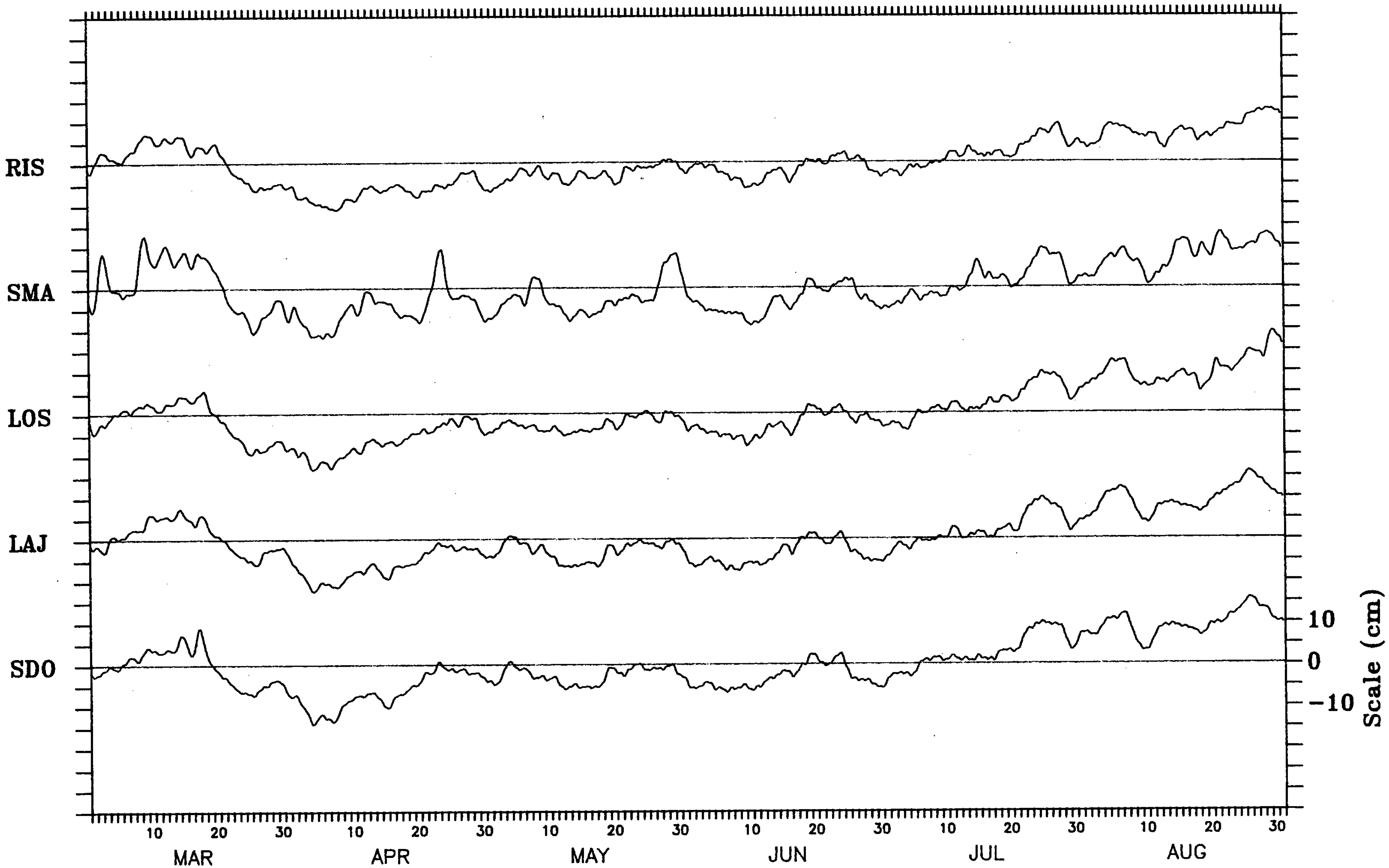


Figure 8E

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16. Abstract (Limit: 200 words)

The Coastal Ocean Dynamics Experiment (CODE) was undertaken to identify and study the important dynamical processes which govern the wind-driven motion of coastal water over the continental shelf.
This report presents a basic description of the moored array data and some other Eulerian data collected during CODE-2. A brief description of the CODE-2 field program is presented first, followed by a description of the common data analysis procedures used to produce the various data sets presented here. Then basic descriptions of the following data sets are presented: (a) the coastal and moored meteorological measurements, (b) the moored current measurements, (c) array plots of the surface wind stress and near-surface current measurements, (d) the moored temperature and conductivity observations, (e) the bottom pressure measurements, and (f) the wind and adjusted coastal sea level observations obtained as part of the CODE-2 large-scale component.

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2. Current Measurements
3. Moored Temperature and Current Observations
4. Bottom Pressure Measurements
5. Wind and Adjusted Sea Level Observations

b. Identifiers/Open-Ended Terms

c. COSATI Field/Group

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